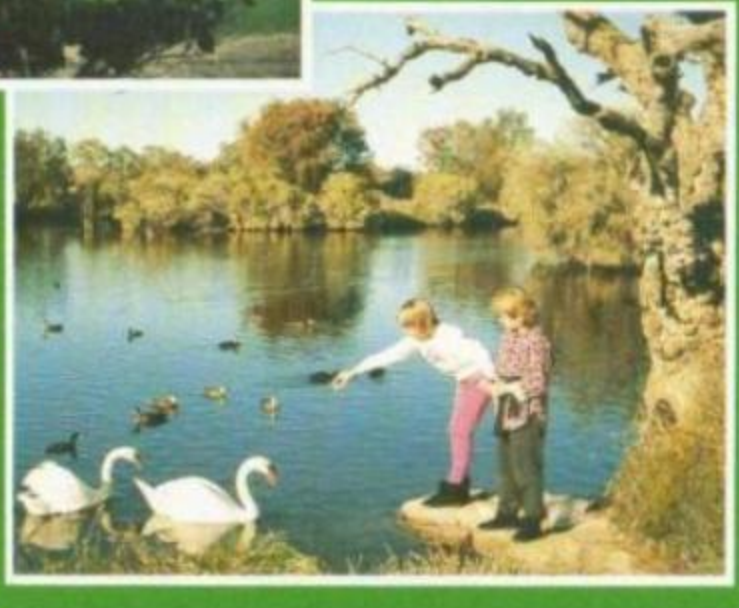
THE AVON VALLEY: THE NATURALISTS' VIEW

Editor
M. Walker



Toodyay Naturalists' Club
Toodyay, W.A.
1986

THE AVON VALLEY: THE NATURALISTS' VIEW

Editor
M. Walker

Toodyay Naturalists' Club
Toodyay, W.A.
1986

Copies available from:

York Society
Toodyay Shire Council
Northam Town Council
Northam Shire Council
Toodyay Naturalists' Club

ISBN 0 9595569 I S

Contents

Acknowledgements

The Toodyay Naturalists' Club owes its thanks to many people and organisations for assistance, past and present, in the production of this book. Our gratitude goes not only to the sponsors already mentioned, hut particularly to those who have assisted with the identification of many species of flora and fauna. We are also indebted to others who have provided photographs and map material, to all our fellow naturalists, and not least, to those who typed the manuscript. All the material in this book and any view expressed therein remains, however, the responsibility of the author concerned, We particularly thank:

The Avon River System Management Committee
Battye Library of W.A. History
Royal Australian Ornithologists' Union, W.A. Branch
W.A, Herbarium
W.A. Museum
W.A, Department of Conservation and land Management
University of W.A. Department of History
Jim R, Davies
Stephen S.F. Davies
John Dell
Rica Erickson
Joy Fleay
Les C. Hodge
George W, Kendrick
Denise Marchant
Neville G. Marchant
Pam Masters, Club Secretary and Publications Officer
Doug Morgan
Royal Western Australian Historical Society
Shirley Slack-Smith
Andrew Williams and Club Members

Introduction

It is seven years since the Toodyay Naturalists' Club produced its first publication called 'The Natural History of Toodyay'. During these years the club has continued its efforts to preserve and record the natural history of the district. At times much research and many deputations to various bodies have been necessary to enable us to protect and preserve the natural state for future generations, the few remaining bushland areas that have survived white man's influence.

The first publication the Club produced is now out of print and members felt there was a call for an update of the booklet which would include a larger portion of the Avon Valley. A suggestion was made that the districts of Northam and York be included.

As a result the Toodyay Naturalists' Club presents to you, the reader, in this year of 1986, an extended book of nature's wonders within the Avon Valley. The Club hopes that 'The Avon Valley: the Naturalists' View, will give those who read it the enthusiasm to look around them and enjoy the flora, reptiles, birds and so much more that is within these lovely hills and along the river Avon.

The writers who have contributed are amateur naturalists dedicated to the preservation of nature.

Although agriculture has altered much of the Avon Valley since the Aborigines lived from its resources during so many centuries prior to white man, the farming portion still has its share of wildlife. Much has gone, as well we know, but let us leave room for that which remains and encourage more where we can by creating suitable habitats. Plant trees, design dams; give wildlife an environment in which to re-establish itself.

On behalf of the Toodyay Naturalists' Club I wish to thank the Toodyay Shire Council, Northam Shire Council, Northam Town Council and the York Society for their financial support in producing this book. I wish you, the reader, enjoyment – not only in reading the printed words but in the pleasure that nature can give if you take time to observe its many facets.

Dawn Atwell,
President,
Toodyay Naturalists' Club 1985/86

The Discovery of the Avon Valley

The Avon Valley and River were discovered by Robert Dale and W.L. Brockman on the afternoon of August 7th 1830.They first viewed them from a hill they named Mt. Mackie, some ten kilometres north of the town of York (soon to be established in the 'rich lands' of the Valley).

Next morning with two other companions and six horses, they came to the river, finding it to be in a great flood of muddy water. With their heavily laden horses unable lo travel along its boggy foreshores, they camped for several days and before returning to Perth, explored up river on foot for some twenty kilometres, including the Dyott Range near York.

Dale's very favourable report to Governor Stirling on the possibility of immediate European settlement of the fertile soils and good grassland found near the river led three months later, to him guiding a party of prospective settlers, including the Governor, back to the Valley near the prominent hill he had named Mt. Bakewell. Dale, with some of this party, then continued on eighty kilometres eastward over the river basin to the granite hills he named Mt. Stirling and Mt. Caroline. Here he found considerable expanses of salty marsh and lake and some fresh water, in a land with soils very variable in quality, some patches having good loam and grass.

As they returned to York they traversed the valley lands about Beverley, finding the river junction of the Avon and Dale. Many ofthe trees in the open woodland were new to them. York gum and Gimlet were particularly noted, together with Sandalwood, first discovered in August 1830 about fifteen kilometres west of Mt. Mackie.

A member of the party on this extended journey, John Wall Hardey, wrote an account containing many astute observations of the country traversed. Perhaps the most pertinent to the future of people living along the Avon River ever since were these comments dated 27th October, 1830. His perceptions were to be appreciated – at least for the next hundred years.

'About 12 o'clock we made the river and were in some measure disappointed .... The rainy season being over, the floods *have subsided,and the true course of the stream, or streams, may be distinctly seen; where the waters prevailed most,at the period mentioned before, may now be discovered alluvial flats, well covered with grass . ... Where the course ofthe water was most contracted in the rainy season, there is as fine a river, to all appearance for half a mile together.as one would wish to see; the fact is these appearances ofa river, are large reservoirs or ponds made by the tremendous rush ofwaters from the hills.*

. . . This stream will be of infinite advantage to the district, yielding an abundant supply of water for man and beast all the year.'

By September 1831the townsite at York had been selected and a few settlers, notably R.H. Bland, were becoming established there. Dale at this time, with George Fletcher Moore and two other companions, again using horses, traced the Avon River branches and the Dale, south-eastwards then southwards, extending the known area about seventy kilometres to near Brookton. They found the Yenyenning Lakes covered with water-fowl on the 22nd September, and in this general area sighted Numbats.

This same party then travelled from York away from the river, taking a north-west course, then trending more northerly below the Noondeening Range, came upon the Avon again on the 4th October, 1831near Katrine, midway between the present towns of Northam and Toodyay. That afternoon they reached a great bend of the river at West Toodyay (this town and Northam were settled in 1836) where it turns south-west on its way towards the sea. After exploring nearby next day, at camp in the Julimar Forest that evening they conjectured correctly that the Avon was the main tributary of the Swan River, though this was not finally proved until May 1834. On 6th October they found the Chittering Valley and Brockman River to the northwest before turning west some eighty-five kilometres distant from York, returning then from near Gingin to Perth (settled July 1829).

In a general way the whole of the Avon Valley, in a little over a year, had been revealed to literate man. Within ten years all river frontage was occupied.

Moore in particular, with other early settlers, went on to explore a great deal of the river basin east and northward of the Avon valley on several expeditions to1836, also finding the Moore River system. He was an erudite and observant man and his diary and reports contain very extensive information about the Aboriginal people and their language, as well as much about the animals and plants, rocks and climatic conditions.

Among other things Moore noted that the exposures of dolerite rock among the granite gave richness and the colour to Avon Valley soils and that flooding in the Avon was not an annual event. By 1836 seasonal conditions made it evident to him and other settlers, not to expect each year the copious rains that prevailed in 1830, and that salt water flowed down the Avon in some years, though not then in trouble·- some amounts.

These few very observant people recorded what is in its essence a limited though very accurate view of millions of years of the natural history of the Avon River and its Valley.

Physiographic Features

"The river rushing over the rocks
forever on its way
carving a path through
the rolling hills
Forever, downward
Forever on its way."
Tim Macknay, 11 years, Toodyay, 1982

The physiography of the Valley within the Shires of Toodyay, Northam and York, shows a complex mixture of topographic and climatic conditions forming the landscape and natural habitats. Since 1831 these conditions have strongly influenced the way in which European agriculture and forestry changed the earlier landscape and developed it into what we see today.

This landscape can be broadly classed into three divisions of land-form and six major wildlife habitats with two merging biological regions - caused by decreases in rainfall from west to east across the Valley.

Rainfall figures from the Shire of Northam show this clearly. At Wooroloo, in the extreme west of the shire, precipitation is about 800 mm, falling to 450 mm at the centre near Northam with a further slight fall to 400 mm near Meckering. Such differences in rainfall affect the vegetation so there are extensive denser forests in the west and much drier open woodland in the nearby eastern areas where now the eastern wheatbelt begins. It has a farm economy based predominantly on cereal growing rather than on grazing as in the more hilly west.

The two biological regions are quite evident since the native or indigenous flora and fauna in the west have many components differing from those in the east. This is most noticeable in the tree and bird species. Of the total of each, some are absent from the western area, some from the eastern. But between east and west where there are broken-up habitats along the river valley, most species may be present.

Regular seasonal rains can be expected to begin from the end of April far into May, often falling earlier in the west than in the east. About 80% of the yearly rain falls between May and October. The remainder is irregular, usually resulting from scattered thunderstorms or cyclonic disturbances. Temperatures vary from warm to hot in summer, are mild during late autumn and spring, and there are some frosts at night during winter.

The incidence of rainfall over most of the Avon River basin, including the Valley, shows considerable variation in intensity over decades (see Figure 1, p.XXI and Map 1, p.II). This variation, in turn, leads to enormous differences in water flow down the river-with years of severe flooding alternating remarkably regularly with periods of low flow. In a few recorded drought years, such as those of 1914 and 1940, there was no flow at all. This variation is of fundamental importance to the nature of the Avon River. It is also important to the townspeople and farmers who now live on its banks – in fact to all who live within the eastern wheatbelt and have a farm-based economy.

Of the three landform divisions, that of the Avon River and its tributaries is dominant. Adjacent to valley floors is the region of rocky slopes and together they form the central division. In the lower reaches of the river past Toodyay these slopes rise sharply to prominent hill tops. Further south east, through Northam and York, they become progressively more open and expand into much gentler slopes.

Over the highland country the old undulating surfaces of the Darling plateau still lie. Though topographically similar in formation, the western division's landscape is markedly different from that of the much drier eastern division. The highest elevations of the plateau lie to the west of the central Avon Valley forming a line from Morangup Hill southwards through Mt. Dale, south west of the York Shire, marking a watershed division from the short coastal Helena River.

The average height of the area is 275 metres above sea level with a maximum height over 500 metres being reached by a few hills of the plateau. Above a height of 240 metres the laterite surface of the plateau is common. Below this surface the rocky slopes drop down to stream channels, the Avon river bed at Northam being 149 metres above sea level.

The present hilly landscape has resulted from erosion caused by the force of re- activated rivers cutting into the ancient granitic and metasediment rocks underlying the plateau. Geological evidence suggests that this had reached the state of a peneplain about fifty million years ago and was followed by laterite formation in the Tertiary Period. The presence of the highest granite monadnocks on the Darling Plateau, existing west of the central Avon Valley, indicates that gentle land uplift took place in that area. It is believed to have occurred very early in the Tertiary period.

Apparently this uplift turned the then sluggish westerly flowing streams into a north westerly course and resulted in the most northerly stream-an ancient 'Swan' or 'Mortlock' -capturing the more southerly streams. The new re-activated and much larger 'Avon' then began carving its valley into the rocks once more.

The plateau is part of the Great Western Peneplain of Australia- the rocks underlying the Avon Valley being a portion of the Yilgarn Block.

These rocks have many characteristics in common with those of the Eastern Goldfields, one being great age. Some of the oldest local samples have been assessed as being about three thousand million years old-as have others of the Yilgarn Block region. In the Avon Valley they are often well exposed and prove of great interest to geologists, often being used by them as good research material for their students. Though the potential exists for the finding of commercially important minerals and much searching has taken place, the only successful development of a few mineral lodes so far, has occurred along the extreme western boundary of this area.

In following the course of the river upstream from the Avon Valley National Park, one finds that it has cut upwards towards the north east through the granitic rocks of the Darling Range Escarpment. Just west of Toodyay it turns abruptly south east on a winding course determined by some favourable folding and by changes in direction of the strike of the ancient underlying metamorphic rocks. This distinctive series of rocks, known as the Jimperding Metamorphic Belt, runs throughout the central and eastern divisions of the Toodyay, Northam and York Shires.

Some outstanding exposures of the rocks, particularly of gneisses and quartzites, form part of the Mt. Bakewell/Dyott Range at York and the Noondeening and Bobakine Ranges which stretch many kilometres north towards Toodyay. They also occur in Mt. Lloyd and Mt. Nardie, nearer the town, forming the great steep-sided bluffs overlooking the river valley. Throughout the region these rocks, together with the much less altered granites, are extensively intruded by doloritic dykes, the dolorite being of relatively recent origin (some 575 million years). The weathering of these exposed dykes has imparted much of the colour and fertility to the red brown soil of the Valley.

The bend of the river at Toodyay marks the point of its transition from a young river upstream to a mature, then finally old river, as seen in the remainder of its inland basin. Valleys increasingly broaden until, along the eastern borders of the Shires, the rolling landscape of farms extends as far as the eye can see. Here is a land of low relief, of great open valleys, with ancient salt lakes and marshes lying within them, all inland from the Meckering Line. About this line, evidence of re-activated rivers ceases. No substantial lakes or swamps exist west of this line and the few small ones present in the Shires are near the rivers or on the remnants of the ancient plateau.

This change in the direction of the Valley to lie roughly parallel to the Darling Escarpment enabled the Avon to develop the largest basin of any river in south western Australia. The central valley, from Toodyay south to York, collects water from rivers and streams flowing from all directions. The Mortlock River drains from the north and east. The Avon's eastern branches intermittently discharge water from a vast area of the wheatbelt as far east as Southern Cross and south east near Hyden, passing through Yenyenning Lakes. Water flows from the south near Wickepin and from the Dale River. The Wickepin branch is often regarded as the headwaters of the Avon, and it, and the Dale and Avon South branches constitute the most regularly flowing of the upper tributaries. The short Mackie River, and western sections of the Mortlock, also flow each year as do all small streams coming in from the west.

The total area of the basin is about 120,000 square kilometres, of which 100,000 only contribute water intermittently. Often all tributaries are *dry* during summer months and the Avon is reduced to a *dry* bed interspersed with a series of permanent pools. In most years, however, in winter and spring, the collected waters pour down the deep valley west of Toodyay to meet the short Brockman River, where the Avon changes its name and becomes the Swan. It is down this steeply graded section of the Valley into the Swan, before it glides tranquilly into Perth, that canoeists may take an exciting ride through foaming rapids.

It was upon the valley floors and adjacent hill slopes of fertile alluvial soils between Beverley and Toodyay that the first European settlers established their farms and little villages between 1830- 1839. For here was good native grass for their small flocks of sheep, cattle and horses, with good water in abundance from the river, streams and soaks among the ancient rocks of the hillsides. It was certainly a good place in which to make a living from the land, for high yields were obtained from their introduced plant crops, grown in the grey soils of the river flats and the red brown earth of the slopes.

It was a place of plenty as the Aboriginal inhabitants had found during their occupation of it for certainly ten thousand years and probably twice as long, before the coming of European settlers. These people dwelt, in considerable numbers, near streams surrounded by Flooded gums, and among the York gum/Jam tree forests that clothed the slopes. There, wild game and food plants abounded, both in the lower country and in the forests and woodland on the plateau.

On the lower granite hill tops in the less fertile soils of the Acacia and Casuarina/She Oak woodland, native grasses grew and this was used as sheep-grazing country by the European settlers. High up on the surface of the laterite the soils are leached and poor grey clayey loams are found in the shallow valleys and gravelly, sometimes rocky surfaces, in the highest country. In places there are areas of white or yellow sandplain soils and also gravel laterite areas which once supported a wonderland of flowering plants and shrubs and still do when left ungrazed or uncultivated. Of the shrubs, particularly in Wandoo country, a few are poisonous to sheep and cattle but not to the native grazing marsupial animals.

Most country of this type could not be used for agriculture by the pioneer farmers before about 1900, when phosphate fertilizers became available. Even after that the sandy and high gravel country had to wait for the introduction of fertilizers containing trace elements (1940) to make them profitable to farm.

Today, although 48% of the land has been completely cleared and 69% is used for grazing, wildlife still abounds, though in a changed

scene.

The descriptions of the six habitats and their flora and fauna which follow, will tell something of the richness and variety of the wildlife of the Avon Valley now existing and in the past.

Avon River Habitat

The intermittent annual flow and longer-term flood cycle of the Avon River are reflected clearly in the type of vegetation associated with it. The banks are lined with Flooded gum *(Eucalyptus rudis)* which also grows along the side streams and upper flood-prone areas often away from main stream channels. With it, and sometimes predominant at slightly lower levels, is a salt-tolerant species of swamp Sheoak *(Casuarina obesa).* A few shrubs and small trees, usually of the Acacia species, grow with a cover of annual grasses, invaders from farm lands.

At low levels right across the river bed in the braided-stream sections, the swamp Paperbark *(Melaleuca rhaphiophylla)* flourishes and also along the summer waterline in permanent pools. It can tolerate great annual variations in water salinity.

Within the towns of Northam and York there still remain sections of the river almost the same as those the early settlers knew. At Northam the area of water retained by the weir provides a splendid example of someof the original habitat and its wildlife.The beautiful White Swans-exotic birds introduced in 1903-are the only non-indigenous species. Time has shown that this bird lives here without too much incompatibility with some twenty species of native water birds, though this is not often the case with introductions.

At Katrine, Millard Pool near Toodyay, and south west towards the Avon Valley National Park, there are still river pools with their original vegetation substantially intact.

Elsewhere, within the three Shires, and later up the river as far as Brookton, the central portions of the river bed forest of Paperbark and Sheoak growing between pools, were removed in the1960s. This was done to increase the rate of river flow and to reduce flooding. To a limited degree it has been successful in most places. However, most of the unstable bed material formerly held by the trees was released by the greatly increased energy flow. This regraded silt or sand now carried down the river has rapidly filled up some pools and reduced the water-holding capacity of most others. It has also resulted in increased amounts of suspended silts being carried through to the estuary of the Swan.

Along the outer fringes of the river the original timber remains, though often thinned out by the grazing of domestic animals. Where the latter are excluded, considerable areas of the open sandy or mud bed have had new species of salt-tolerant plants establish themselves.These are mainly Samphire, salt-water Couch, and a few tussocks and Sedges, while here and there the Paperbark and Sheoak are striving to re-establish themselves in areas away from the channels of intense flow. The river is attempting to revert to its former braided-stream condition.

In considcring changes at present occurring in the Avon River system it is necessary to separate those that have been caused by European settlement, notably dryland farming, from those induced by rainfall of a cyclical type that have remained constant to the natural regime of the river for many centuries, thus controlling the structure of the river's bed.

As indicated by the first observations of the explorers, Dale, Hardey and Moore, periodic floods followed by extended dry periods were to become well known characteristics of this area over the second half of the nineteenth century, even though very little forest clearing took place.

In 1847 many of the early settlers' cottages on river banks were flooded, this to be followed by severe drought during much of the 1850s. Wetter conditions returned from 1857 until 1862 when a great flood destroyed many of these early homes on the river floodplain - particularly from Northam to West Toodyay below the Avon's confluence with the Mortlock River.

An explorer of the Eastern Goldfields region in 1863, Henry Maxwell Lefroy, wrote this interesting observation in his journal dated 9th May, 1863 when in the vicinity of Mt. Stirling.

> *'About midway in this day's joumey we reached the western side of a chain of shallow lakes, or sandpans, at the present season of the year perfectly dry, but in the winter receiving the drainage of an extensive tract of country to the north and east ofMt Stirling.... These lakes overflow from one to another only in a very wet winter like that of last year; and their overflow then has caused all parts of the Avon to be more or less brackish throughout the past summer; the overflow carrying with it into the Avon the salt accumulated in the beds of these lakes during the past ten or twelve preceding years in which no overflow has taken place.'*

Dry times prevailed over the remaining 1860s until copious rains occurred during 1870 and 1871. After scattered heavy rainfall over the river basin during the summer and autumn of 1872, that winter the most severe flooding ever recorded took place in the lower Avon. From Northam downstream through Toodyay, a flood crest about a metre higher than any other since then, passed through during the night of July 18th/19th destroying all the homes that had withstood the 1862 flood.

Two old buildings still in use today, a barn at Katrine and a church at Toodyay that were erected on safer sites in 1860 and early1862, withstood both these great floods. It is from the known flood levels in and about these two buildings that it is established that the 1872 flood reached a level exceeding all others here during 150 years.

Rainfall recording started in parts of the Avon Valley in the1870s and since 1884 there is continuous data on a daily basis. Using some of this, a graph (Fig.1, page XXI) is shown of rainfall variation with years of known river flooding since then.

It is obvious from this, together with the earlier observed severe floods and dry periods with their associated salt and silt movement, that the flood cycle and its intensity are little altered since European settlement. lt is also apparent that the inland lakes exercise a marked control upon the rate of water and salinity discharge down the river.

These conditions have existed over the Avon River basin little changed since a written record began, and they still prevail, dominating considerations of correction to imbalances in the Avon River environment that really are the consequence of dryland farming and the forest clearing.

Salinity of the Avon River water increased slowly from 1900 to 1940 following the great extension of forest clearing in the river basin. From 1935 to 1944 there were very dry winters, followed by floods during 1945and 1946 which again brought down great volumes of accumulated salt from the inland lakes, in much the same way as Lefroy had noted nearly a hundred years earlier. This time, however, the now well known problem of rising water tables on cleared valley farmland releasing stored salt from deep levels of the soil intervened. The river waters have remained very salty evcr since and in consequence some species of the fauna and flora have changed.

There is now a fairly consistent slow seepage of this water into streams and rivers, thus keeping the Avon flowing longer each year than it used to do. Also a faster run-off of surface water from farmland is apparent in many places, with increased soil erosion early in winter.

There is little doubt that more seemingly excess water flows down the Avon than it did before land clearing occurred, though the volume is not great. But the assumption that increased flood levels must account for the discharge of this extra water is not valid since the history of the Avon's floods in no way supports this, nor have there been climatic changes to account for it. There is good fresh rain water being lost somewhere.

Currently, research is being directed to this apparent paradox and is also concentrating on the closely related conservation problems of the whole river basin - those causing local flooding, salinization of farmland, wind erosion and excess loss of soil nutrients. Among other things, there are also searches for the missing water!

Is this evaporating in greatly increased quantities from cleared farmland and salinized soil areas as well as from the ancient salt marshes and lakes? Could it possibly be that this great volume of 'lost' fresh water is nearly as much as the former forests transpired? Can this loss be reduced or prevented by changes in farming practices, provided they are of advantage to all and can be sustained economically in relatively dry land?

Should the speed of water discharge in the Avon be reduced to that existing before the clearing of its bed? These fascinating and serious

questions need answers, and resolution of the problems presented, if conservation of the Avon River basin is to be stable and effective so that the nature of the river through the Valley is preserved.

These problems are not unique to the Avon. They are known and have been the subject of detailed research in other parts of the world having similar climate and topography.

Within the Valley, the few remaining large summer pools, though now brackish and salty, together with some fresh water seepage near river banks, form a permanent although possibly harmful home for a large number and variety of river-based fauna. Before the present high salinity levels were established in these waters, aquatic species were adapted to living in muddy water ranging from 400 milligrams per litre in winter to a maximum of 3,000 milligrams per litre at the end of summer.Today, the species still present have to contend with a situation of strongly flowing, brackish, muddy water in winter, never lower than 2,000 mg when in flood, and rising in summer, in the still water pools, to as high as 17,000 mg of dissolved salts at the end of the season.

Periodically, severe pollution from surface run-off now occurs in the river pools, particularly after thunder-storm rain in summer and autumn. This, as well as the prolonged seepage of ground water into the river, now brings in excess nutrients, particularly phosphates.These changed conditions have stimulated excessive growth of algae in stagnant pools at these times of year, leading to deoxygenation of the water. Recently, in the deeper pools, there have been cases of direct poisoning from hydrogen sulphide development.

When such adverse conditions occur, they are lethal to all the small water-based fauna and flora, and the recent development of them is a far greater menace to the ecological balance of the river environment than that posed by the changed salinity alone.

It is therefore amazing that so much life still persists in these pools. The composition of the minute organisms is largely unknown, but creatures such as molluscs -six species of them, notably *Fluviolanatus subtorta* - are present in various pools. The large bi-valve *Westralunio carteri* once a common source of food for the Aborigines is now rare and restricted to a few localities. The crustacean, Jilgie, is common in sidestreams and where fresher water pools occur near the river. There are few species of fish, the only large one being the freshwater Cobbler, a catfish. During major floods Mullet, an estuarine fish, may move up river and remain in pools over the summer. However, it will not breed, and disappears after a year or so.

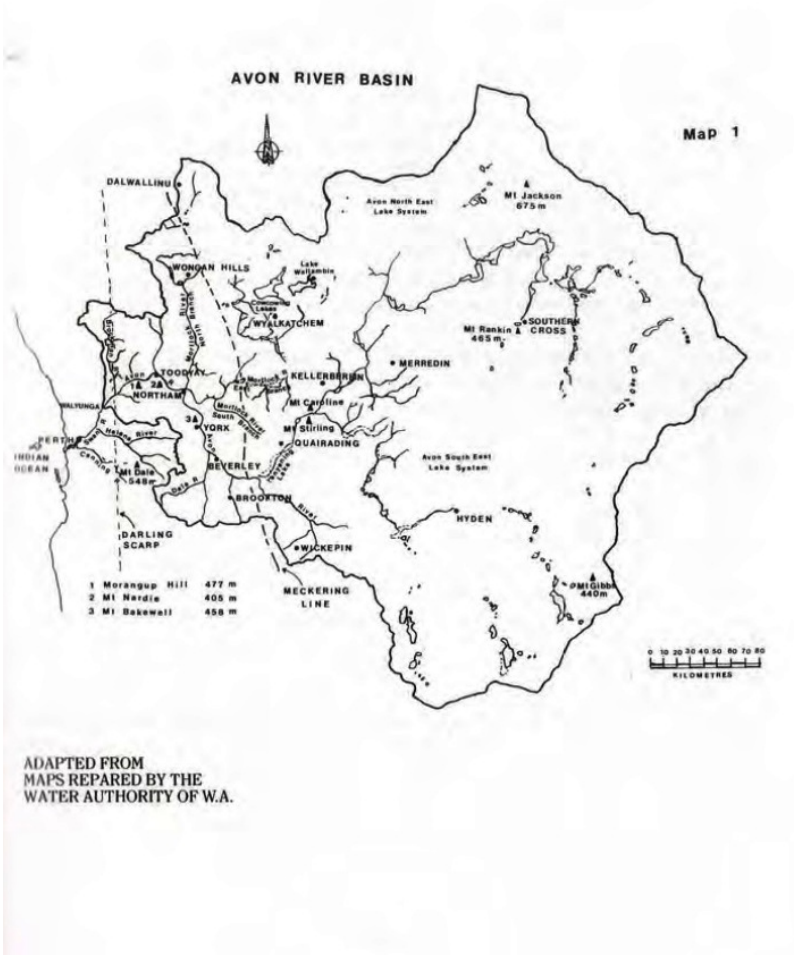
The long neck tortoise that wanders out of the water to the river banks looking for nesting sites during November and December is common. The large bright brownish and poisonous Gwardar snake is also to beseen along the river at this time. Occasional specimens of the harmless Carpet snake may be found in old hollow Flooded gum trees.

These trees also harbour the Brush-tailed possum and in quiet places, Grey kangaroos and a few Euros come into the river forest. Hollow limbs in the Paperbark trees, particularly when in flower, support several other species of small marsupial. Bats of several species abound and may be heard clicking their way over the river pools in the evening. An occasional water rat is also present near some pools.

The river habitat provides a haven for a large assortment of bird species. Some ninety wetland and dryland species have been recorded, the latter ranging out into adjoining habitats. Fifty- three species have been recorded breeding within the river indicating the importance to them of the pools and riverside vegetation. Commonly observed birds include the White-faced heron and Australian egret, Grey teal, Black duck, Shelduck, Coot and the two Little cormorants, Black s, and Pied. Occasional Pelicans and Black swans visit the area as well as the Black tailed native hen. Common small song birds are the Splendid wren, Scarlet robin, Rufous whistler, Grey shrike-thrush, Western warbler and Western thornbill and Yellow-tailed thornbill.The Black-fronted dotterel, Pied stilt and the migratory Common sandpiper frequent upper sections of the river while Sacred kingfisher and Laughing kookaburra appear throughout. Brown goshawks, the Australian raven and Whistling kites perform the main predatory and scavenging functions in the air by day and the Barn owl by night. Foxes and feral cats among the large predators quite effectively supply this service elsewhere within the river, the foxes being particularly adept in digging up tortoises' eggs.

So plant and animal life goes on in just as great a variety of ways, even if changed a little from that Dale first saw on those rainy days so long ago. lf the pools remain to provide sanctuary, the present environmental balance of this most vital feature of the Avon Valley may remain; may even, with care, be enhanced.

'In nature there are neither rewards nor
punishments – there are consequences
R.G. Ingersell 1833-99



Map 1
York Gum- Jam Tree Woodland

One of the most prominent tree associations in the Avon Valley is the York gum, *Eucalyptus loxophleba,* and Jam tree, *Acacia acuminata,* which is widespread throughout the district. Good examples can be seen in the Pelham Reserve at Toodyay and in the Bewmalling Reserve in the north of the Toodyay Shire where a small remnant area of this type of woodland is located. It also occurs in most uncleared country in Northam and York Shires east of the Marri belt. It was here that the common name for York gum was derived. The Aborigines called it Yandee. Owing to much clearing, this type of woodland in its original state is rather rare, but the trees themselves are still plentiful.

The York gum is a rather straggly tree often reaching up to about sixteen metres in height and frequently having more than one trunk.The lower parts of the trunk and limbs are covered with rough grey bark with the higher branches being smooth and brown, often with a reddish tinge. The deep rooting system enables it to survive drought conditions and it is fairly salt tolerant. The small creamy flowers yield a medium amber honey.

The smaller Jam tree grows to about seven or eight metres high. This tree (being one of the wattles) presents a marvellous picture over the countryside in the springtime with its brilliant yellow blossoms.

Together the York gums and Jam trees form an open woodland with a lower shrubby undergrowth, and are found growing on heavy loam soils amongst granite outcrops with clay subsoils. Other trees sometimes found growing in association with these are Salmon gums and Red morrel in the eastern sections, and in the west they overlap with Marri, also with Sheoaks in low-lying wetter areas and with Flooded gums along water courses. In past years Sandalwood was also associated with these trees. It provided a very important export industry as its aromatic wood was shipped to China and India to be made into joss sticks and used as incense. It has now been virtually cleared out of this habitat.

In the early days of settlement by Europeans this type of country was favoured because of the native grasses found growing there, and sheep were shepherded amongst the trees before the timber was cleared. When it was realised that York gums and Jam trees indicated very fertile soils for agricultural purposes this was some of the first land cleared by the settlers. Most of the native grasses have disappeared although a few species of stipa may still be found in some locations in the Avon Valley. Both trees yielded valuable timber. The York gum with its interlocking grain was difficult to split, which gave it greater strength and so it was favoured by wheelwrights for wagon building. It had the reputation of being unsurpassed for this type of work. It had been used for centuries by the Aborigines for making spears. The wood of the Jam tree was valued for fence posts because of its resistance to termite attack. Many miles of farm fencing were erected with this timber, and some erected in the last century can be seen still standing in the Avon Valley. Nowadays, it has been largely replaced by steel posts.

The Harper fence which utilised the Jam wood, was another type of fence used by the pioneers. Its timber was also attractive for cabinet making. It owes its name to the fact that the smell of the freshly cut wood resembles raspberry jam.

Uncleared areas of this country today still carry vast numbers of wildflowers including various species of Orchids, Sundews, Trigger plants, Fringed lilies and Dampieraa, Purple-tassels and yellow and pink Everlastings. At one time the hillsides were covered in masses of pink Everlastings making a spectacular show in the springtime. However, grazing stock has greatly reduced their numbers.Small trees and shrubs include the needlewood, Grevilleas, Manna wattle and other small wattles, Parrot bush and Honey myrtles. Granite outcrops add to the

attraction of the scenery. Where extensive flat rock surfaces exist, the run off from rain enables an ephemeral plantlife to develop in shallow depressions where soil has gathered. Although very tiny these plants reveal their extreme beauty when viewed under a magnifying glass. These depressions quickly dry out in the warm sun. In the deeper soilssurrounding the rock a thicket of small shrubs often occurs.

Kangaroos and wallabies had originally fed on the native grasses and may still he found in the district, having adapted well to the introduced plants.

The ant- and termite-eating Echidna lives throughout the Avon Valley although its scratchings and diggings in the bush are more often seen than the animal itself.

Silver grey possums find resting places in the daytime in the hollows that are often found in the limbs of York gums, and come out at night to feed on the leaves of the Eucalypts and the mistletoes which are common in Jam trees.

The hollow limbs of trees are also used by a number of birds for nesting, such as members of the Parrot family, Owls, Sacred kingfishers, Kestrels and Tree martins, while small knot holes provide nesting places or Striated pardalotes. Various species of Honey- eaters are attracted to the flowering trees and shrubs as their beaks and brush-tipped tongues are specially adapted to extract nectar from these flowers.

Insect eating birds are found searching for food among the leavesand under the bark or in the litter on the ground. The nomadic Purple-crowned lorikeets follow the flowering of many Eucalypts including the York gums, but the Regent or Smoker parrots at one time seen in their hundreds feeding on the seeds of the Jams, are now rare. Other seed eating birds such as Finches and Pigeons may be seen fossicking for the seeds of grasses and legumes.

Throughout the Avon Valley it is of the utmost importance that the various reserves of York gum and Jam tree habitat be maintained as 'islands' of natural bush as the farming activities continue to exert pressure on the uncleared country still remaining

Wandoo Woodland

Wandoo, (*Eucalyptus wandoo),* sometimes in association with Jarrah (*Eucalyptus. Marginata*), Marri (*Eucalyptus calophylla*)), powder bark wandoo (*Eucalyptus accedens*) and York gum *(Eucalyptus loxophleba)*was once distributed over a large part of the Toodyay, Northam and York Shires. Clearing for agriculture has removed a large portion of these forests. Those remaining are to the north west of Toodyay, Julimar State Forest No. 61 North, Bindoon Army Training Area (no public access) and the small Wongamine Nature Reserve in the north east.

The Wandoo woodlands of Northam and York Shires are represented by the State Forest covering Mundaring Weir catchment area reserve, mainly south of the Great Southem Highway. Additionally to the west, Northam has Clackline Nature Reserve. To the east and adjacent to Great Eastern Highway, are Meenaar Reserve and some other small reserves, mingling with the farm lands of the district. York also has some small reserves, including St. Ronan's Well Nature Reserve.

Wandoo is a handsome smooth barked tree growing up to twenty metres in height. The new autumn bark is creamy in colour, changing to white with grey spots as it ages. It grows mainly in clay sub-soil valleys and in a sociation with Powderbark wandoo, on the lateritic slopes of the winter flowing Julimar and Spice Brooks and their tributaries.

Like many eucalypts, wandoo has a fairly definite flowering cycle varying occasionally, probably due to climatic conditions.Some treescan usually be found floweringevery year but the vast majority of the forest flowers every two to four years, mostly from September to early January. However, in the Julimar Forest there are some areas that flower from March to June. The two periods of flowering are recognized by apiarists as spring and winter flowering.

Mundaring Catchment area Wandoo is mainly spring flowering, butsome trees can beseen carrying blossom in autumn and winter.This is a bonus for nectar loving birds. In the Mundaring Catchment area there are wider valleys and the winter flowing streams mainly feed into the Helena River, on which Mundaring Weir is situated. On the flat laterite soils above the slopes, the forest consists mainly of Jarrah and Marri, a magnificent mass of creamy white flowers when in bloom in late summer. Bees flock to this bountiful source of nectar and much good quality honey is produced.

Wandoo also provides high grade honey and along with Jarrah is of great value to the beekeeper.

Wildflowers abound in the Wandoo woodland inspring with Dryandra species -Pingle, Couch and Parrot bush being most noticeable. Hibbertias, some beautiful yellow types and the rarer Verticordias, also add colour in the under-storey of the forest. Bull banksia and in summer *Banksia menziesii* and *Banksia prionotes* are also attractive forest plants. Many hectares of grass tree can be found throughout the area with their creamy spikes extending skywards when flowering. Approximately twenty species of orchid have been found.

Wandoo forest is remarkable for the diversity of the fauna it may sustain, as exemplified by the well researched Dryandra Forest near Narrogin and the small Tutanning reserve near Pingelly. Though not so closely studied, near Toodyay fourteen species of marsupials have been noted in the Wandoo woodland, conspicuous being the Grey kangaroo and in shrubby places the Western brush wallaby. Brush tailed possums, Pygmy possums and Honey possums occur. The Numbat has not been recently noted but may still exist in areas not excessively burnt where there are large rotten branches and old hollow logs. A monotreme, the Echidna (a ground dweller), still thrives utilizing the termite mounds so characteristic of this forest type and is quite often active by day like the Numbat.

Nearly one hundred bird species with fifty-nine breeding have been found locally, among them being Emus and Wedge tailed eagles.The flowering trees and shrubs provide a more or less constant food supply distributed sporadically over the area, and large numbers of small birds, including New Holland honeyeater, Yellow plumed honeyeater and Spinebill honeyeaters, move nomadically, except when breeding, in search of it. Others, such as the striking Western yellow robin, Golden whistler and the rich brown Rufous tree-creeper, being largely insectivorous, mostly stay in their favoured haunts through the year, delving under bark and litter. The Western ringneck parrot and Elegant parrot, remain in areas of seed supply while the White tailed Black cockatoo moves in flocks all over the forest.

All these large forests have yielded many loads of good quality saw logs, Wandoo being particularly useful, yielding high density, very strong, almost 100% termite resistant sawn timber. The lower grade Wandoo logs were taken to the Industrial Extracts factory in Toodyay for production of tannin extract until it closed in 1972.

The early settlers, using large wooden mauls and steel wedges, split fence posts from selected Wandoo trees. Many of these posts are known to be in good condition after fifty years. Railway sleepers were also split from Wandoo stands on farms and were squared and shaped with a broad axe.

The taking of all these mature trees has created a much younger forest, particularly in Julimar, where there appears to have been much more regrowth than in Mundaring, probably owing to much heavier felling by Industrial Extracts.

Northam and York Shires are fortunate in having these unique, relatively well preserved Wandoo habitats which along with Toodyay's Julimar State Forest No.61 Management Priority Area, have a very good chance of being preserved for posterity.

Jarrah-Marri Forest

Natural areas of Jarrah-Marri forest with their associated under- storey are found in the wetter western section of all three Shires.

Stands of jarrah do not extend east of the Avon River and while the marri's range extends into the agricultural areas, it virtually remains only as isolated shade trees in cleared farmlands

The bark of both trees is dark in colour and does not shed with the change of season as does the lighter coloured Wandoo and Powderbark wandoo.

Jarrah, *Eucalyptus marginata,* one of the world's finest hardwoods, has red-grey, stringy bark and flowers in late spring to early summer. An attractive feature of the buds are the small pixie-like caps which lift and turn to yellow as the cream-coloured flowers open.

The other tree of the association, the marri, (*Eucalyptus calophylla),*is dense, usually about sixteen metres tall with heavy branches almost touching the ground and large pendulous leaves, well deserving their scientific name *'calophylla',* meaning beautiful leaf. Its creamy masses of flowers are borne in February-March and the ripening fruits attract large numbers of the White-tailed black cockatoo. A distinguishing feature of the tree is the mass of large 'nuts' that fall to the ground. As the fruit ripens, White tailed black cockatoos arrive seeking the seeds, tearing at the fruits with their powerful beaks. The brilliant green Twenty-eight parrots (Western Ringneck) also share the harvest, usually eating the fallen seeds, while the beautiful Red-capped parrot with the apple green rump is virtually restricted locally to this Marri habitat.

The Jarrah-Marri plant communities reach their western limits within the three Shires. The brilliant red *Grevillea wilsonii* accompanies the jarrah and both reach the limits of their range in the same area. The unusual hooded smokebush *Conospermum glumaceum* with its yellow bracts, extends its range to the northern edge of the Toodyay Shire.

Some of the most attractive flowers of the forest belong to the Lechenaultia family, Goodeniaceae. The popular blue *Lechenaultia biloba* is aptly named 'piece of the sky' by the Aborigines. The robe blue Dampieras are named after William Dampier, an early English navigator who explored our shores in the year 1688 and was the first European to comment on the wide variety of blue colours amongst our flora,

The Monocots are represented by the well known grass tree *Xanthorrhoea pressii.* The name Xanthorrhoea, refers to the yellow resin which exudes from the flower spike, and the species name *pressii* is in honour of the German botanist who visited W.A. in 1839-1842. He accompanied James Drummond, of Hawthornden (Toodyay) on botanical expeditions in the State, particularly to the Toodyay, Northam and York areas. The unusual kingia, *Kingia australis,* is found in the three Shires. Like the grass tree it has a caudex and may reach up to five metres in height. However, unlike the grass tree, which produces a long spear-like flowering spike, it has numerous drum- stick flower heads. The leaves differ too, in being shiny and broader at the base. The wonder of plant life is well demonstrated in the extraordinary form of the grass tree and the delicate flowers of the genus Thysanotus, or Fringed lily, for both were once regarded as members of the same family, the Liliaceae. Recent treatments of the Western Australian flora do not recognise the Liliaceae. The genera formerly placed in that family are now placed in a number of separate families. Xanthorrhoea now belongs to the Xanthorrhoeaceae and Thysanotus to the Anthericaceae. Fringed lilies are found in creeper forms with single flower heads and in a magnificent massed flower head - for example *Thysanotus. multiflora.*

The deep blue flowered creeper *Hardenbergia comptoniana,* and the rich orange coloured flowers of the coral vine, *Kennedia coccinea,* drape themselves like shawls over rocks and shrubs. Both are members of the pea family and are related to Oxylobium and Gastrolobium, members of the Papilionaceae family, well known to have members poisonous to stock. The early farmers suffered substantial stock losses and it was some time before these plants were finally proved to be responsible.

Stock losses were recorded as early as 1830, but it wasn't until the early 1840s that the native plants responsible were positively identified. Early stockmen knew from previous experience in England that leguminous plants provided excellent fodder and it is this fact that possibly made it harder to establish the cause of stock deaths from native members of the pea family. Arguments between the botanist James Drummond of Hawthornden, Toodyay, and the visiting botanist Ludwig Preiss, only added to the settlers' confusion. At first Drummond doubted the Gastrolobiums because he had observed Bronze-wing pigeons eating their seeds and they suffered no ill effects. He also knew if people ate the pigeons they too suffered no illness. However, dogs that ate the bones of the pigeons died.

Ludwig Preiss was so sure York Road poison was harmless he drank what was reputed to be wine glass of diluted fluid which had been extracted from the leaves. He suffered no illness at all and recommended that the plant was the best thing to grow in cultivation for stock. The arguments raged until eventually by feeding stock some suspected plants, and then the animals dying, the colonists gradually learnt about the poisonous nature of these plants. Local knowledge due to difficulties in communication was slow to spread and the science of the day was very primitive. It wasn't until the identification and recognition of the plants were established by professional botanists and the information stored in the State Herbarium that accurate information was available. The specimens, as well as the early recorded details collected since the beginning of the European settlement, constitute valuable sources of knowledge on poisonous plants.

Members of the group of poisonous plants are found not only in the Jarrah-Marri plant communities but extend their range into Wandoo and Powderbark vegetation.

Poisonous plants can usually be identified by noting a few characteristics. Firstly the flowers are pea-type, usually yellow and red. The leaves are opposite and mostly have a sharp point at the end, and have at their base, where the leaf joins the stem, two small stipules or spines.

Other members of the pea family are found in the Jarrah-Marri forest. *Daviesia decurrens* and *Daviesia incrassata* colour the bushland with masses of flowers in the late winter.

The Acacias, or wattles, have their members both in shrub and tree forms. Their golden blooms light up the bushland like balls of sunshine. The she-oaks, *Allocasuarina fraseriana* and *Allocasuarina huegeliana,* with their long needle-like branches - mistakenly called leaves - add variety to the bushscape.

The genus Hibbertia, which characteristically has yellow flowers that arc sometimes called 'buttercups', has over sixty species in the south-west. They are well represented in the Jarrah-Marri woods and extend their range into the drier eastern parts of the Shires. The species *Hibbertia lasiopus,* a large-flowered prostrate shrub, is common in Jarrah-Marri forest, while *Hibbertia montana* extends its range to Mt. Bakewell at York. It was here that it was first collected by Ludwig Preiss in 1839. Preiss was a botanist of great note who collected carefully and recorded the locations where he botanized. He clambered over the Darling Range to Boyagerring Brook near Toodyay where he collected the 'Type' specimen of the grass tree *Xanthorrhoea pressii*. He travelled on to York and at Mt. Bakewell he collected twenty-two specimens of plants. About five of these, too, have become Type specimens used by botanists as vouchers to catalogue our flora. These areas called "Type locations' are of tremendous value and interest to plant lovers and students of botany. They are of great botanical and historical interest and add depth to our knowledge of our bushland.

The stands of Jarrah-Marri woodlands within the three Shires are magnificent. Large areas exist in a relatively undisturbed state, in the water catchment reserves in York, the western areas of the Northam Shire, the Avon Valley National Park and the Julimar Forest in Toodyay. Their plant populations are rich and diverse. It is still possible to visit these areas and to feel the serenity and wonder of the bush, to enjoy its plant life

and observe its birds and animals. Tragically little of the natural vegetation exists in the eastern parts of the Shires, but here, amongst the strong dark Jarrah and Marri trees, it is still possible to feel engulfed in the glorious peace and quiet of nature.

Kwongan: Plants of the Sandplain

The sandplain plant communities are represented in the three Shires, York, Northam and Toodyay. They occur on light sandy soils, the area originally ranging in size from a few hectares to many hundreds. Now only fragmented populations are found in natural hushland in the rugged hills in the western regions of the Shires, or along narrow road verges and small pockets of Shire land in the eastern section. All sandplain plant communities are rich in species, some common to all areas, while others are represented in only a few locations.

The vegetation is basically low scrub, with a scattered higher canopy of banksia, melaleuea and eucalyptus trees, Proteaceae and Myrtaceae being the two prominent plant families. Three species of banksia, the orange coloured *Banksia prionotes,* the crimson red *Banksia menziesii* and the yellow flowered *Banksia attenuata,* hold their bold strong eandlelike- flower spikes out to attract birds, small marsupials and insects. Many species of Dryandra are found, including the common parrot bush, *Dryandra sessilis,* the shaving brush flowers of *Dryandra nivea,* and the grey f'oliaged *Dryandra kippistiana.* At least five species of smokebush colour the landscape. The common smokebush *Conospermum stoechadis* is widespread and represented in practically all areas, while the beautiful plume flowered *Conospermum incurvum* is very restricted and only recorded in the Toodyay Shire. *Adenanthos cygnorum,* or woolly bush, is found in most areas along with *Hakea ruscifolia* and *Hakea trifurcata,* the pink mop flowers. *Isopogon dubius, Isopogon linearis,* and *Grevillea pilulifera.*

The Myrtaceae family are represented by the vivid coloured calytrix or star flowers. Their masses of purple and yellow flowers colour the bushland in late spring and early summer. Amongst the varied Myrtaceae are also the eucalyptus, mainly in mallee forms. *Eucalyptus transcontinentalis,* a slender and many stemmed mallee with masses of cream flowers, *Eucalyptus drummondii* with its creamy rust bark and rounded bud caps or opercula and even the jarrah, *Eucalyptus marginata* are found, although the last is much reduced in stature from the magnificent trees of the Darling Range. Both the cream and red flowering forms of our largest flowered *Eucalyptus macrocarpa,* are represented in the eastern section of all three Shires.

Several species of Casuarinaceae extend their range into the sand- plain communities. *Allocasuarina huegeliana* is common to all areas but the unusual horned casuarina *Allocasuarina thuyoides* is found only in the York Shire.

The monocots are well represented by the orchids. The strange flying duck orchids, three species of hammer orchids and hare orchids are numerous, though seldom flowering. The well known cowslip, *Caladenia flava,* is common along with the club spider orchid (*Caladenia corynephora).*

No mention of the sandplain plant communities would be complete without listing the fascinating lambstail group, their tiny flowers concealed in soft grey wool *Physopsis spicata,* a plant usually found near Eneabba is present in all three Shires, although very localised. The unusual grey leaved *Lachnostachys albicans,* and the tall growing *Lachnostachys verbacifolia* are found in two small locations in only two of the Shires.

Members of the heath family are found on the edge of the sandplain and extend their range into light gravel soils. After the hot dry summer it is a delight to sec rich red Astrolomas and the white slender flowered heath, *Styphelia tenuiflora,* brightening the dry bushland. Unlike the autumn flowered heaths two species of bottlebrush, *Calothanmus sanguinius* and *Calothanmus quadrifidus.* produce their red bottle-brush-like flowers throughout most of the year, providing a continuous food supply for birds, particularly the Brown honeyeater, Spinebill and Tawny crowned honeyeaters. Because of the wealth of flowering plants, the sandplain heath habitat provides both birds and animals with areas for food and shelter.

Grey kangaroos and Black-gloved wallabies share the berries of the heaths and many species of both insects and nectar feeding birds share the many flowers.

In 1836 James Drummond, the colony's first resident botanist, was attracted to these areas. He was quick to appreciate their diverse floral wealth and they drew him like a magnet. He was the first botanist to use the indigenous name 'Kwongan to describe the sandplain and its vegetation. He followed the 'Kwongan' sands as they stretched north to Wongan Hills, he then travelled south to York and Greenhills. He carefully collected his plant specimens and forwarded them to England. It is from many of these specimens, called ‘Type’ specimens, that the botanists of the day first catalogued and described our plant families.

The sandplain heath plant communities of York, Northam and Toodyay are rich both botanically and historically. They held a fascination for the European botanists of the 19th century and still hold a strong fascination for plant lovers and botanists today.

Open Field - Farmland

Grazed farmland extends over about 69% of the three Shires of Toodyay, Northam and York and the completely open-field situation now covering 48% of the area did not exist in the natural state.

At the time of first European settlement, all areas except for some streams and the river, had a dry sclerophyll open woodland with only the York gum/Jam tree portions supporting a substantial cover of annual grasses and herbs.

Consequently, few native local species of flora and fauna were pre-adapted to living in the open agricultural field situation which has come to dominate the landscape this century. The introduced annual pasture plants and cereal crops, and the greatly increased grazing pressure from herded domestic animals, have altered plant communities considerably - eliminating virtually all native annual grasses and inhibiting the regeneration of trees and shrubs in farmland.

These changes had a marked effect on the former species living there - from the micro biota upwards - leaving today those able to live only in the now restricted native habitats, those partially adapted to the new situation, those which have come in from other areas, those which have been introduced and those wholly adapted. A very considerable number of the larger animals has found ways to utilize the farmlands, mostly in conjunction with adjacent habitats.

The Stubble quail, Richard's pipit (or Ground lark), the Brown song-lark and the Banded plover were all completely adapted. They are still quite common and breed successfully. Another bird, the Australian dotterel has, during recent years, colonized the agricultural areas, having moved from its original native habitat in the arid interior. Such birds only require minimum shade and water during very hot weather.

The additional supply of cereal grains, clover and grass seeds has enabled the spread of the Galah and Crested pigeon from the dry interior south-westwards throughout the district during the last thirty years.

Few of the smaller marsupials now remain - the insect eating Dunnart being one which has - and their places have been taken by introduced rodents (mice and rats) now food for the native Gwardar and Mulga snakes. The non-arable rock outcrops are extensive, some still with areas of trees, and they support many species of lizards, native ants and spiders; and also, wherever ground cover exists, a wealth of insects and other creatures, many of them new introduced species.

Such places are particularly favoured by hawks, the Brown falcon, Kestrel and Black-shouldered kite - the latter another bird colonizing the area during the last fifty years. In all farmland areas these birds and the Wedge-tailed eagle are found as predators as also are the introduced **Fox** and **f**eral Cat.

Another introduced animal, the Rabbit, had a disastrous effect on the natural environment of the Avon Valley from its first appearance there in any great numbers in the 1920s.

In many places its depredations made regeneration of most native species of plants impossible and greatly affected the productivity of farm crops. Fortunately, owing to the successful release in the 1950s of the specific rabbit disease, Myxomatosi**s**, the former plague proportions of this animal have been well controlled. However, it is proving difficult to prevent the great losses of native wildlife caused by the introduced predatory animals - the feral foxes and cats - even though the disease, dog mange, periodically reduces the fox numbers.

The last group of birds mentioned above and some fifty others, including Emus and Ravens together with the Grey Kangaroo and Euro and some large lizards, notably the Bobtailed skink and Gould's goanna, use the open-field habitat most effectively by combining it with, at least some timber in farm woodlots or road verges.

All these species must have this second habitat for breeding, for general shelter and as an additional food source. Thus by the meeting of the woodland and the open fields the interesting phenomenon of the 'edge effect' is created. This effect, most noticeable on farms, is that a more diverse and abundant fauna is maintained about the edges of two adjacent habitats than may be present in the main body of each. Similar situations occur in natural forest land, anywhere that such things as large treeless rocky areas or dry lakes create a sudden change in habitat

In the open field situation the Australian shelduck and Maned duck, making use of farm dams, have increased tremendously. Conversely, though there are new sources of fresh water, the fresh-water favouring Black duck, and to a lesser degree, the Grey teal duck have decreased because of much greater salinity in local streams and the Avon River - their former natural sources of fresh water.

Additionally, the Shelduck, adapted to all degrees of saline water at other times, now provides severe breeding-territory competition at many supplies of fresh water, chosen because it is vital to young ducklings. Cereal crops provide nesting sites for some ducks, quails and a few Landrails but nearly all other birds must have some trees, including old hollow ones.

The latter are often old Flooded gums, Wandoo or Powderbark Wandoo Eucalyptus trees that may have taken a hundred years or more to reach a state of hollow formation - some existing examples are certainly many centuries old. They provide food and havens, also nesting and breeding sites, for innumerable species of other creatures, including most of the local bats and Carpet snakes. And they furnish termites with rotting wood in abundance for a wonder- land of tiny life. Most other species of trees have much shorter lives and do not form hollows as readily, so it is those old patriarchs of the past forest land that provide a vital base for the well-being of much fauna.

The presence, on farms and roadsides, of woodlots containing a mixed group of old and young trees and shrubs, is essential to sustaining a rich and varied fauna. Due to seasonal variations in the availability of local food within small areas of woodland, much of the fauna needs to move each year to other places.

As a fortunate consequence of there being some stony non-arable surfaces in the Avon Valley, most farms are well endowed with a scattering of trees and woodland. These, linked by the still-timbered road verges to major forest areas, undoubtedly enable the great diversity of our original wildlife to be retained though many species are greatly reduced in number and some are even facing extinction as their special habitats disappear.

In recent times, open fields, dams and changes in water salinity, have even brought in new species - probably as many as have been eliminated. But the loss of some, such as the Black bittern, is regretted. This bird lived on a specialized diet of freshwater mussels and crustacea and disappeared when these species in the river changed.

In general this kind of natural balance is something to be pleased about, but it is obviously a delicate balance and can be easily destroyed by further development unless due consideration is given to all the complex inter-relationships of the natural environment.

The great beauty of the present Avon Valley landscape - that of river and forest with the dominant scene of great areas of rich farmland nestling among the hills - is part of this progress and development. Ever increasing numbers of people come to share with those who live here this beauty and harmony in nature.

This district quality called landscape is our heritage. It also has a commercial value and it would he a pity to destroy it, if only for this reason.

But there are other more compelling reasons for its preservation and perhaps, in this oldest area of inland farming in Western Australia, the lesson has been learned before too much is lost, that in time all natural things have an inherent place and value if allowed to continue.

Live as if you die tomorrow
Farm as if you live forever
Old English proverb

Natural Features of some Reserves and the Towns

For locality see Map page XXII.

The Nature Reserves described here in some detail and some others are administered and protected by the State Department of Conservation and Land Management. To protect the wildlife it is a regulation that visitors to them may enter only on foot from designated vehicle parking

areas or adjacent public roads. No one may camp or bring dogs into these reserves and the removal of flora and fauna, rock or any other natural object, is not permitted.

There are public access roads to the Avon Valley National Park and the State Forest areas enabling the visitor free entry to these places. Over most of their area exploration is usually by foot from a road system within them. A Ranger is resident at the Park.

Apart from additional Town and Shire reserves and roads, other land in the district is privately owned including most river foreshores. The local authorities have provided a number of picnic areas with some that give access to the river where bridges exist or in the towns. Altogether there are very many places for visitors to view wildlife.

Northam is the largest of the riverside towns and it is controlled by the Town Council, not by the Shire. It has a great deal of wildlife still remaining in the river, gardens, woodlots and open land. Much of this is also to be found at York and Toodyay.

Descriptions of the natural habitats of these towns and the three reserves follow.

Municipality of Northam

Area 2580 hect - Rainfall 435 mm. The town has considerable natural wildlife still existing, some thriving in a suburbanised situation.

In the original natural state the predominating habitat would have been York gum/Jam tree country surrounding the Avon River. Today the river is substantially unchanged over much of its course through the town except below the weir, where formerly a Paperbark forest grew. The removal of this in the 1930s together with a progressively great increase in the salinity of the river's waters since then, have been the main changes. However, the care and protection of the weir area, upstream to the town boundary has enabled a large amount of wildlife to remain, in easy view for people. Small examples of degraded Wandoo woodland are present on the lateritic soils near the Army Reserve on the high country west of the town along the Perth road. Below this are substantial stands of York gum/Jam tree still present in the Commonage and about Waterfall Gully, where the stream exposes the granitic base rocks. The public lookout area on the summit of Mt. Ommanney, just to the north of the Perth road past the railway, provides a viewing place among the open fields and farmland surrounding the town. Throughout all this area the red brown earths of the rocky slopes occur.

The two branches of the Mortlock River system come together near the racecourse east of the town before entering the Avon, and timber along these streams with more Sheoaks *(Casuarina obesa)* adds a further character to the nature of the varied habitats that still exist.

The Towns of York and Toodyay

Both these towns have similar natural habitats to those at Northam, They have more extensive Wandoo woodland nearby on Mt. Bakewell at York and above the race course at Toodyay, though less water area in the river. At York there is a public lookout area on the summit of Mt. Brown situated in York gum/Jam tree woodland with another look- out soon to be provided on Mt. Bakewell.

At Toodyay an extensive road system exists about the summit area on Mt Lloyd/Majestic Heights - also a lower lookout in Pelham Reserve, with walking trails nearby through York gum/Jam tree woodland.

Wongamine Reserve - Area 213 hect. - Rainfall approx. 450 mm

This reserve is in the eastern part of the Shire of Toodyay. Soils are lateritic, with gravelly and sandy loam among rocky 'breakaways' over the higher country, down into reddish clay loam in the broad valley. Two deeply incised valleys lead into it in central parts. The reserve in general has a vegetation of Wandoo woodland, here with Powderbark well represented. Salmon gum occurs near the eastern edge indicative of the lower rainfall, while an interesting outlying small stand of Jarrah, usually seen much further west, occurs on private land immediately adjacent to the north-western boundary. A small area of sandplain heathland is present on high country near the northern edge. Here the flora is of striking contrast to that of other surrounding areas, with some of the fringe supporting Drummond's gum.

Exposure of the granitic base rock is virtually absent and consequently there is no surface water available in the reserve during most of the year.

Meenaar Reserve - Area 65 hect. - Rainfall approx, 410 mm

This small reserve with lower rainfall is in the eastern part of the Shire of Northam. Near the Great Eastern Highway, it is at relatively high elevation and has soil types characteristic of the ancient peneplain surfaces of the wheatbelt. Three basic habitats exist. York gum/Jam tree occurs on grey clay and loams in the broad flat valley where the drainage line now shows recent salinization. This merges upslope to the south into gravel and sandplain heathland, changing into Wandoo woodland on clayey gravel at the highest point. In this reserve, surface water is seldom present except during short periods after heavy rain when the creek may flow and pools form in gravel pits. Though much dissected by roads, tracks and the Goldfields water pipeline, a remarkable number of plant and bird species still occurs there.

St. Ronan's Reserve - Area 118 hect. - Rainfall approx, 600 mm Shire of York.

This reserve affords good examples of the flora and fauna of the high rainfall western region where the plant species of the under- storey are often different from those of the east. Wandoo woodland exists over a large part on solid clay gravels with smaller patches of heathland and Marr (without Jarrah) in places where deeper sand or loam soils occur about this high country. Extensive outcrops of granite rock among heathlands extend well into the middle of the reserve from the northern boundary. The water drainage from this rock forms a deep channel southwards and together with other granite areas along the south boundary adds considerably to the interest and diversity of the habitats, providing small though temporary water collection places with every passing shower of rain.

On the species lists of flora and fauna are indicated, by symbol some wildlife observed in the Town of Northam and the three Nature Reserves. These reserves are representative of others both east and west of the central Avon Valley.

Species listed tor Northam and Wongamine have been recorded since 1976 and for Meenaar and St Ronan's Reserve since 1984.

Flora and Fauna
Reptiles and Amphibians

No account of native animals would be complete without mention of the reptiles, and these may be found in all habitats of the Avon Valley. The list of lizards and snakes in this book indicate the number of species which have been recorded here.

Unfortunately people tend to be fearful even of the lizards, but in reality some of them are attractive creatures. None of the lizards is populous and many are useful as insects feature largely in their diet. The largest of the goannas, the Bungarras, also eat mice. Some of the small, soft velvety bodied Geckos are frequently seen at night around houses and other buildings especially in warmer weather, searching for insects after spending the day hiding in crevices in the buildings or under the bark of trees in the bush. The digits on some species are so adapted that they can even walk on the underside of the ceiling in a room. As they are nocturnal they are usually plain and not brightly coloured. A feature of Geckos is their ability to shed their tails when threatened by predators, which are then distracted by the wriggling tails, allowing the Geckos to escape. New tails are then grown. A Gecko's eyes are each covered with a transparent scale, and because they have no eyelids they can sometimes be seen washing their eyes with their tongues. Some Geckos are capable of making sounds, for example, the Barking gecko.

The scale-footed or legless lizards which have no visible front legs and with the hind legs reduced to just mere flaps are true lizards but are unfortunately often mistaken for snakes and killed. Legless lizards may also be identified by blunt fleshy tongues instead of the slender forked tongue of a snake. They are useful, as termite and other insects are part of their diet. Like Geckos they are able to shed their tails when attacked by a predator.

Another group, the Dragons, are fast moving lizards and can be recognised by their short heavy heads, powerful limbs and very long tapering tails. The Dragon family of lizards contains the Jew lizards with spines on the lower jaw which give them the popular name of Bearded dragons. The prettily marked patterns on others are noticeable if they are approached quietly without disturbing them. One of the easiest places to see Dragons is on flat granite outcrops which are the homes of Rock dragons.

These shelter under the loose slabs of rock and come out to warm themselves in the sun, only to scurry quickly away whenever someone approaches. Another most interesting although bizarre creature is the Mountain devil. Its soft body belies its looks. It is quite harmless and feeds on small black ants.

In the Avon Valley the Skink family is represented by more species than is any other family of lizards. Of these most may be seen during the daytime, although some are nocturnal. Some are very small being only about 9cm long, but more noticeable are the active Fence skinks often seen on garden fences chasing flies, or the contrasting sleepy Bobtail, perhaps the best known of our lizards. It is quite harmless in spite of its show of aggression, which is mainly bluff. Also harmless is its relative, the Western blue- tongue, less well known in this district. Skinks, with their broad flat tongues, hunt insects, although the Bobtail and Blue-tongue include berries and other vegetable matter in their diet.

Two of the largest of our lizards, the goannas, inhabit the Avon Valley, one being the Bungarra which grows to a length of about 1.5 metres. Because of its size it was a favourite source of food for the Aborigines in the past. A smaller species is the Black or Race- horse Goanna. These Goannas have powerful limbs and long necks, and their forked tongues flick in and out of their mouths when alert. They eat a wide variety of foods ranging from insects to larger prey.

Of the snakes found in the Avon Valley the largest would be the Carpet snakes which may grow up to about two metres in length. These pythons are non-poisonous and may be found in the hollows of trees. They are protected by law as their food consists largely of mice and rats. For this reason they are sometimes kept by farmers in their sheds to rid them of these pests. Recently the slightly smaller Children's python has been recorded on a number of occasions between Northam and Toodyay. Another python, the Woma, was known to be in the district up until about 1950 but is now regarded as extinct here, although it is still found east of the Avon Valley. The olive brown Mulga and the Gwardar are the most common of the larger venomous snakes each attaining a length of 1.5 m or more. The Gwardar is the wheatbelt and inland relative of the Dugite but is much brighter and has variable colourations, mostly with a black marking on the back of the neck, whereas the Dugite which is found mostly in the western and southern parts of the area is much duller and more drab. One of the Gwardar's colour forms is banded and is sometimes confused with Tiger snakes. A striking colouration consists of an orange body with jet black head.

It has been suggested that the Gwardar and the Dugite may sometimes hybridise, The Gwardar has seventeen scales around the middle of its body and the Dugite has nineteen. Two snakes have been found together under the same rock just south east of Northam. One had definite bands darker and lighter and about 7 cm apart similar to a Gwardar and the other was plainer coloured and both had nineteen scales around the middle of their bodies the same as a Dugite. This may support the theory of possible hybridisation.

In the wetter places near the western boundary of the Avon Valley Tiger snakes may be found. These four species - the Mulga, Dugite, Gwardar and Tiger snake - are all dangerous,

There are several species of small snakes growing to about 30-50 cm long, but these are not often noticed. Those occurring in the Avon Valley include the Black-naped snake, half-ringed snake, Black-headed snake, Five-ringed and Bandy Bandy snakes and also the Yellow-faced Whip Snake (which may grow to 80 cm).

There are four species of Blind snake or Worm snakes. These are small nocturnal burrowing snakes which may be found under termite nests where they feed on the inhabitants. They have smooth shiny scales, curved mouths situated well back on the underside of the head, and eyes which are just small dark spots.

An interesting feature of both lizards and snakes is that some species lay eggs and others produce live young.

There is only one species of turtle, the Oblong Turtle (mistakenly called Tortoise) which is common along the Avon. At one time it was fairly common along the Mortlock River also but is not readily found there now.

Frogs

Of the frogs found in this area there are nine species of ground frogs and two species of tree frogs. At certain seasons of the year the chorus of frog calls can be heard for some distance as they arise from swamps and low lying places.

The lists of reptiles and frogs on the Reserves are not complete, and doubtless many more species exist there.

Frogs, Tortoises & Reptiles

(Doubtless many more species exist on the reserves)

Key to Reserve Sightings

	Symbol Used
Wongamine Reserve (Toodyay)	Wo
Meenaar (Northam)	Me
St. Ronan's Well (York)	St
Town of Northam	No
***Family LEPTODACTYLIDAE* (Ground Frogs)**	
Crinia georgiana Tschudi [Red-thighed Froglet]	
Heleioporus albopunctatus Gray [Burrowing frog, Spotted]	St
Heleioporus barycragus Lee [Burrowing frog, Yellow-flanked]	
Heleioporus eyrei (Gray) - Moaning frog	
Limnodynastes dorsalis (Gray) - Western Banjo frog	St
Myobatrachus goutdii (Gray) - Turtle frog	
Neobatrachus pelobatoides (Werner) - Humming frog	
Pseudophryne guentheri Boulenger - Günther's toadlet	
Ranidella pseudinsignifera (Main) [Possible hybrid]	
***Family HYLIDAE* (Tree Frogs)**	
Litoria adelaidensis (Gray) - Slender Tree Frog	
Litoria moorei (Copland) - Western green & Golden bell frog	
***Family CHELUIDAE*)Long-necked Turtles)**	
Chelodina oblonga Gray - Oblong turtle	No
Chelodina colliei Gray - Long-necked turtle	No
***Family GEKKONIDAE* (Geckos)**	
Crenadactylus o.ocellatus (Gray) - Clawless gecko	Me, St
Diplodactytus granariensis Storr	Wo, St
Diplodactylus polyophthalmus Günther	
Diplodactylus pulcher (Steindachneri)	St
Diplodactylus spinigerus Gray –Western spiny-tailed gecko	Me
Gehyra variegata (Duméril & Bibron) - Tree dtella	Me, St, No
Oedura reticulata Bustard - Reticulated velvet gecko	St
Phyllodactylus marmoratus (Gray) - Marbled gecko	St
Phyllurus milii Bory - Barking gecko	St
***Family PYCOPODIDAE* (Legless Lizards)**	
Aprasia pulchella Gray	
Aprasia repens (Fry)	
Delma fraseri Gray	St
Delma grayii Smith	Wo
Lialis burtonis Gray - Burton's snake-lizard	Me, St
Pygopus lepidopodus (Lacepede) - Common scaly-foot	Wo, St
***Family AGAMIDAE* (Dragon Lizards)**	
Ctenophorus ornatus(Gray) - Ornate granite dragon	St, No
Ctenophorus reticulatus (Gray) - Netted dragon	
Moloch horridus (Gray) - Thorny mountain devil	Wo
Pogona m. minor (Sternfeld) - Bearded dragon	St
***Family SCINCIDAE* (Skinks)**	
Cryptoblepharus plagiocephalus (Cocteau) - Fence skink	St, No
Ctenotus fallens Storr	
Ctenotus p. pantherinus (Peters)	St
Ctenotus schomburgkii (Peters)	
Egernia kingii (Gray)	
Egernia multiscutata bos Storr	Wo, St
Egernia napoleonis (Gray)	
Eremiascincus richardsonii (Gray) - Broad-banded Sand swimme	
Hemiergis i. initialis Werner - Western earless skink	
Lerista distinguenda (Werner)	St
Menetia greyii Gray	Wo, Me, St, No
Morethia obscura Storr	Wo, St
Tiliqua occipitalis (Peters) - Western Blue Tongue	
Tiliqua rugosa (Gray) - Bobtail	St, No
***Family VARANIDAE* (Monitors/Goannas)**	
Varanus gouldii (Gray) - Bungarra or Gould's monitor	St
Varanus tristis (Schiegel) - Black racehorse goanna	St
***Family TYPHLOPIDAE* (Blind Snakes)**	

Ramphotyphlops australis (Gray)
Ramphotyphlops pinguis (Waite)
Ramphotyphlops waitii (Boulenger)
***Family BOIDAE* (pythons)**
Liasis childreni Gray - Children's python [Incorrect – most likely Stimson's Python]
Python spilotus (Lacepede) - Carpet snake
Family ELAPIDAE Snakes
Demansia reticulata (Gray) - Yellow-faced whip snake
Notechis scutatus (Peters) - Tiger snake
Pseudechis australis (Gray) - Mulga snake St
Pseudonaja affinis Günther - Dugite No
Pseudonaja modesta (Günther) - Five-ringed snake
Pseudonaja nuchalis Günther - Gwardar No
Rhinoplocephalus gouldii (Gray) - Black-headed snake
Vermicella bertholdi (Jan) - Bandy Bandy snake
Vermicella bimaculata (Dumeril, Bibron, Dumeril) - Black-naped snake
Vermicella semifasciata (Günther) – Half-ringed snake St

Birds of the Avon Valley

Birds are the most easily visible and mobile of all the animals. Observation of their population and movement is one way to measure degrees of environmental change that affect all living organisms.

First this requires accurate identification since each species has a way of life that in some way will be found to differ from all others. This allows a great diversity of species to exist, most in the Avon Valley taking advantage of their great mobility to fully utilize scattered habitats.

An understanding of why these birds are found where they are, and when, together with the number of individuals present also helps to indicate the state of their environment over great areas of the countryside in W.A.

The list of birds in this book gives the names and status of about 185 species that have been recorded in the three Shires during the past ten years. Of these, 124 were found to be nesting during the breeding season, which usually occurs between August and December.

Migrants

Some birds are marked in the list as 'migrant'. This indicates those that move away north by mid autumn, nearly all individuals of these being absent in late autumn and early winter. The Cuckoos are the first to come back, starting to appear in late winter with the other species arriving over September and October when most will breed here. Those that do not are trans-equatorial migrants that go to the tundra lands of North China and Eastern Siberia to breed during the northern summer. Of these the Common sandpiper appears most frequently along the Avon River. Others are scarce though coming in considerable numbers to the lakes of the river basin in late spring at the time of southward migration, particularly Red- necked stint and Sharp-tailed sandpipers. Other true migrants move only into northern Australia and some cuckoos, Rainbow bee-eaters and Sacred kingfishers have many individuals that travel to the Indonesian Islands and Papua New Guinea. There are groups among Fairy martins and White-winged trillers that breed either in southern or northern Western Australia much earlier in the north than here, which also occurs with Pallid cuckoos.

The most beautiful of these migrating birds, the Rainbow bee-eaters, is also the most regular, arriving in noisy flocks at the end of September and departing in flocks in the first fortnight of March. Most other migrants arrive silently and then commence to call as they establish breeding territory, later to depart just as quietly with their young.

Nomads

Not marked in the list are the great majority of our birds that are far more locally nomadic during the year.

Unlike migration, nomadism implies that such birds will move only as far as the nearest available good food supply. Under the climatic conditions that prevail over much of the very dry inland of Australia this movement can be in any direction. In the Avon Valley most of it is seasonally induced by rainfall regularity and humidity, temperature change having only a minor effect.

With all these birds some individuals or pairs do remain resident about one small area throughout the year if conditions are good. The Raven that raids the farm orchard or fowlyard is an obvious example. Mated pairs of these will stay for years in one place while their broods each year join during November the roaming flocks of non-breeding adults that travel many hundreds of kilometres about the countryside.

Residents

Quite often these birds that become very familiar to people are a number of sedentary resident species.

Willie-wagtails, Rufous whistlers and Grey shrike-thrushes may live their entire lives about one small area of woodland or even a large garden, often in pairs. Magpies, Yellow-throated miners, Splendid fairy-wrens and most of the Thornbills do this in discrete social groups that remain in a local feeding territory for many years. Feeding flocks of mixed species of little birds are found moving through woodland, particularly during summer and autumn. These will include some of the sedentary species. As very nomadic birds like Grey fantails, Striated pardalotes and Weebills pass through they are joined by Wrens, Whistlers and Thornbills. It is interesting to note that the latter drop out as the boundary of their territory is reached and neighbours will then join the moving flock. The social groups of Magpies and of tiny Fairy-wrens very actively defend their feeding territory throughout the year against other groups of their species. Constant defence of feeding territory is uncommon, though all birds do vigorously defend their nesting territory from the time of nest site selection until the young are fledged.

Distribution

During recent surveys of the birds in the central Avon Valley, within a land area of only twenty square kilometres 163 species were found to occur. For such a small area this number is somewhat greater than is usual in most places of southern Western Australia well inland from the

coast. Mixed habitats close together attract many migrant and nomadic birds to a place that is here all farmland, with about ten per cent of woodland and river unused by grazing domestic animals. The Valley's proximity to the higher rainfall refuge areas of forest and coastal plain causes the appearance of many that must move across or along it. Additionally the river, with some remaining permanent water pools together with a good deal of riverine vegetation, forms part of this more humid summer refuge. Here the greatest number of species will be found in early summer until autumn.

A further factor is that 'Bassian' type birds, for example Little watttebirds and New Holland honeyeaters who favour high rainfall country, do not range far eastwards beyond the Valley. An almost equal number named 'Eyrean' in nature, such as Mulga parrots and Spiny-cheeked honeyeaters, usually remain east of the river in the much drier country. The combined effect of these conditions results in considerably more species being found each year within a few kilometres each side of the Valley than are likely either west or east of this zone, with the greatest numbers being present in late spring and early summer (when also most true migrants are here). It is seldom that more than twenty-five species can be found about a small bushland reserve during a day, though constant observation in the same area throughout a year may well find that three times this number use it. This certainly shows the great amount of movement that does take place. When nesting starts, much long distance movement stops and it is then that many species are easily found and observed.

Irruptive Birds

A small number of species are marked on the list to indicate they 'irrupt'. These are all Eyrean types that are extremely nomadic and roam over vast areas of the arid inland of Australia. Masked wood swallows, Crimson chats, Diamond doves, Cockatiels and Budgerigars sometimes appear in this district particularly east of the river. They may stay for a year or two then totally disappear again for a decade, even in some known cases for forty years. If they return in large numbers, some breed here.

The most frequently appearing is another of these arid land nomads, the Black-tailed Native-hen, a water bird that always provokes considerable interest among people first seeing this attractive bantam-fowl like creature that periodically appears in great numbers. Scattered flooding of the Murchison and Goldfields region as well as the north-eastern Wheatbelt certainly influences the movement of this bird. As with the others, the evidence suggests their appearance may follow after a particularly good run of seasons even further north and east has developed an excess population. Should sudden drought then occur many of these birds are forced to move southwest. It is of some interest that usually when major irruptions of these birds have extended into the Central Wheatbelt and some have reached the Avon Valley this region has also been suffering a rainfall deficiency.

Stray individuals of most of these species appear at other times and it is not unusual for stray or 'vagrant' individuals of many other species of birds to occur. Budgerigars, particularly, can be escaped cage birds, though most others are wild single vagrants. The appearance of truly irrupting birds is known to have occurred from the first years of European settlement and continues apparently little affected by land clearing.

Historical Change

Some records of Avon Valley bird-life exist from the early period and those of John Gilbert between 1839 and 1842 mention Diamond doves and Black-tailed native hens. The botanist and naturalist Ludwig Preiss was active then, as was James Drummond with his son Johnston, resident pioneer farmers at Toodyay.

These people provided extensive records and collected many specimens of plants and animals about the Avon Valley. Drummond and Preiss are particularly renowned for their botanical collections while the work of John Gilbert who collected for John Gould (after whom the Gould Bird League is named) provides most information about the birds and marsupials. The explorers Dale and Moore, also mention wildlife.

For about eighty years after this early effort, only stay references to birds that are specific to this area can be found in journals and diaries or as specimens in museums. However, unwritten information gained from local people who resided here between 1870 and 1930 has been useful in identifying changes that have takenplace.

In 1931 C.F.H. Jenkins wrote about the birds near Northam and since then they have been under increasing investigation particularly during the last twenty-five years.

The evidence of change after 150 years of agricultural development suggests that there are as many species here now as in 1830 though quite a few are not the same ones. Native birds adapted to open land such as Banded lapwings, Brown songlark, Richard's pipit and Stubble quail gained an initial advantage from cleared fields and had become very common by the 1940s. There is no evidence since then that further increase has taken place; indeed, numbers of Lapwing have again decreased, though Little quail do seem to appear more frequently.

In regard to total bird numbers in the Avon Valley it is very evident that some increase in numbers of birds that use the open fields now, has not anywhere near compensated for the vast decrease among forestland birds during the past thirty years. One very evident consequence of this is the present day scarcity of raptors such as Goshawks, Harriers and some Falcons, predators that kill other birds, now limited by shortage of prey.

As numbers fell and a few species disappeared from forest country others from more open dry woodland and cleared fields appeared. The changes all seem to have occurred since about 1890. Not surprisingly the most rapid change has taken place since the 1930s following upon the accelerated rate of forest and heathland clearing in the wheatbelt then later westward into the high rainfall country. During recent years it has become disquietingly obvious that though a great number of beautiful and interesting species occur, the numbers of individuals of most are still decreasing, Changes would seem to be permanent, though one interesting exception has occurred. The long-billed form of the Little corrella had disappeared by 1900 after being in pest numbers fifteen years earlier. During the late 1950s a few pairs returned and it is now breeding freely and forms large flocks east of the Valley. However the somewhat similar Pink cockatoo, resident in the nineteenth century has totally disappeared though a number still remain in the north-eastern wheatbelt.

Very sedentary ground feeding birds of woodland and scrub face extinction from excessive burning of these now reduced areas. The Southern scrub-robins may have disappeared at Wongamine only in the past ten years and none are known elsewhere in the Shires. The chestnut quail-thrush reported in the Julimar Forest in the 1950s has not been sighted recently and these are not known to exist elsewhere near the Valley.

The Black bittern and the Brown bittern are water-frequenting birds that were specialized to the margins of secluded freshwater pools in the Avon River, and they have not been sighted since water salinity increase destroyed their preferred food of molluscs and crustacea during the early 1950s.

Obviously loss of woodland and sandplain flora greatly reduces food supplies for many species of birds. Not only does it reduce local numbers, it also seriously affects movement of birds as their food changes seasonally. This has occurred with White-tailed black cockatoos, Dusky wood-swallows and probably many others that disperse inland during autumn. Up to the 1930s these two species spread eastwards over the wheatbelt during autumn and winter, crossing the Valley in large numbers. They have virtually ceased doing this and their now greatly

reduced population is confined to moving north and south in forest lands west of the river. Their appearance now in the Central Wheatbelt is very limited as a result of excessive clearing.

Dispersal eastward and northward still continues with Red wattlebirds and quite a few other Honeyeaters, occurring also with some of the small insectivorous and berry-eating species including Grey fantails, Striated pardalotes, Western gerygone, Mistletoe- birds and even Silver-eyes. Over summer many of their population move back into the more humid south-west and west coastal areas, though others do stay about pleasant spots like gardens or shady woodland. Apparently, a bird of the air and house verandahs, the Welcome swallow also enjoys a summer holiday along the coast at this time of year, not many staying either during hot weather or the cold of winter, since most return in September.

There is little doubt that woodland birds can now only undertake these essential movements by travelling along roadside verges, stream vegetation and through farm woodlots. Isolated reserves are not enough and it is becoming increasingly apparent that the maintenance of these now sparse 'pathways' is required to sustain large viable populations of birds everywhere.

Preservation of wetlands, both fresh water and salt, is just as important for all our native water birds. About the only one that is sedentary here in the Avon Valley is the Dusky moor hen. All the others are endlessly corning and going except when breeding.

As a few original species disappeared and most others were reduced in numbers, four introduced species have become acclimatised, and about ten other native birds have moved in from the north and east. Most of them favour the more open countryside, are seen easily, and like long resident Magpies and Ravens, are now common birds. Another less noticed old-timer the Tree martin is still probably the most numerous bird here and is likely to go on thriving as long as old hollow trees for nests remain.

By 1908 the beautiful White swans from Europe had been acclimatised at the Northam Weir. Unlike the native Black swans and the Australian pelicans that visit, they have never shown any desire to move away long the river. Though in a feral state at Northam, it seems that the hand-feeding they receive is as great an attraction to them as they are to the Town of Northam.

Both the Laughing turtle dove from Asia and the Laughing kookaburra of Eastern Australia were introduced at Perth, then Northam and elsewhere between 1898 and 1910 and are now common breeding birds throughout the three Shires. Less successful are feral Pigeons that no doubt were released much earlier but are far more confined near towns and farm buildings, probably due to predation by Falcons elsewhere.

It was not until the 1950s that other new birds, all native to W.A. started to advance from the north-east across this region, although strays appeared earlier. Galahs were among the first, quickly followed by Crested pigeons, and both started breeding within ten years. Similar movement soon followed with the still uncommon Inland dotterel and, almost unnoticed, the Chestnut-rumped thornbill, these two birds still remaining largely east of the river. Earlier the Black-shouldered kite, to be seen hovering over grassland like the long resident Kestrel, appeared in the Valley during the 1930s. This bird started breeding within ten years and as it spread it has partly displaced the Kestrel. As with most raptors it is never in large numbers except on a few occasions when others irrupt. This may be an instance of a nomad becoming a resident as the local environment changed - in this case, longer grass from pasture improvement being favourable to mice but less so to grasshoppers and the Kestrel.

Change has also occurred with waterfowl. Australian shelducks and Maned ducks were absent in the Avon Valley and west of it before the 1950s, though present earlier near lakes and swamps in the wheatbelt (the Shelducks all this century). The advent of bulldozers enabling rapid extension of open fields and the provision of many farm dams has allowed them to occupy all this area and become common. Little grebes have also benefited from these dams. All others in fact have reduced in numbers, even though they quite often seem prolific on the few remaining river pools. This is particularly so with Black ducks, Grey teal and other such game species that congregate at the pools during the daytime in summer, dispersing at night to feed about the surrounding countryside. In an effort to protect all waterbirds in the Avon Valley the river areas between Northam and West Toodyay and the National Park downstream are not available for duck shooting.

The necessity for such measures has occurred only during the last twenty-five years. In the past, duck shooting had been a very minor influence, if any at all, in bringing about the decline in numbers of waterfowl. Rather these sorts of restrictions protecting refuge areas for flora and fauna should be seen as a consequence of major changes in the environment affecting the survival of most native animals.

Among the great diversity of birds that still appear in the Avon Valley there are no more than twenty species that might still thrive if all trees and shrubland were to disappear. All the remainder, residents, nomads or migrants alike, must have timber and shrubland or extensive areas of protected wetland to provide food, nesting sites and shelter, as most move about the country-side throughout Southwestern Australia.

To destroy or further damage any more of these areas, thereby blocking the pathways for movement of so many birds that come and go, could well indeed create a less attractive and very Silent Spring* - no pesticides required.

* Carson, ***Rachel:*** 'Silent Spring'. *Penguin, 1970.*

Avon Valley Birds

Shires of Toodyay, Northam and York

Attached are records in one wildlife reserve in each Shire together with the Town of Northam.

Symbols Used:

These indicate habitats (1, 2, 3, 4, 5, 6, 7, 8) where the birds have been recorded-with their status, (X, Y, Z, and B). Birds recorded are sightings since 1975. Status and Range are from records since 1930. The range of some species end about the valley and the occupied area is shown East (E) or West (W).

Habitats:

(1) York gum/Jam

Grows on the naturally occurring most fertile soils. In general surrounds most major drainage systems at lower elevations than other woodland.

(2) Wandoo Woodland

In general at medium to high elevations with a clay subsoil throughout region, Powderbark wandoo occurs with it at high elevations,

(3) Jarrah/Marri

In general on well drained soils on the highest elevations of laterite in the western areas of greatest rainfall. Marri also occurs on well drained soils to a limited degree in the (1) and (2) habitats.

(4) Sandplain Heath land

Usually occurs at the highest elevations.

(5) Open Farmland

Open fields with few trees.

(6) Avon River

Permanent water pools, Flooded gum, Paperbark and Sheoak trees.

(7) Swamps and Dams

Fresh water.

(8) Lakes and Mortlock River

Brackish to saline water.

Records in the three Wildlife reserves and Town of Northam

Status:

X = Common	Y = Uncommon	Z = Scarce
B = Breeding bird	E = East mostly	W = West mostly

Migrant:

Usually present between September and February each year,

Irrupt:

Appear some years only.

Rare:

Very few records in fifty years.

Introduced:

Not naturally occurring

Key to Reserves

Wongamine	Wo
Meenaar	Me
St. Ronan's Well	St
Northam Town	No

This list is the result of many years of observation but is not intended to be complete. Doubtless other species will be observed by visitors to the reserves. (B/N – Breeding/Nonbreeding)

Scientific Name	Common Name	Habitat	Status	B/N	Reserve
Dromaius novaehollandiae	Emu	1,2,3,4,5	W	B	St
Podiceps cristatus	Great crested grebe	6,7	Z		
Poliocephalus poliocephalus	Hoary-headed grebe	6,7,8	X	B	No
Tachybaptus novaehollandiae	Australian grebe	6,7	X	B	No
Pelecanus conspicillatus	Australian pelican	6,7,8	Y		No
Anhinga melanogaster	Darter	6	Y		No
Phalacrocorax carbo	Great cormorant	6	Z		
Phalacrocorax varius	Pied cormorant	6	Rare		
Phalacrocorax safcirostris	Little black cormorant	6,7,8	X	B	No
Phalacrocorax melanoleucos	Little pied cormorant	6,7,8	X	B	No
Ardea pacifica	Pacific heron	6,7	Y		
Ardea novaehollandiae	White-faced heron	1,2,3,5,6,7,8	X	B	
Ardeola ibis	Cattle egret	6,7	Rare		
Egretta alba	Great egret	6,7	Y		No
Nycticorax caledonictus	Rufous night-heron	6,7	Y	B	No
Threskiornis aethiopica	Sacred ibis	6,7	Z		
Threskiornis spinicollis	Straw-necked ibis	5,6,7	Y		
Platalea regia	Royal spoonbill	6,7	Z		
Platalea flavipes	Yellow-billed spoonbill	6,7	Y		
Cygnus atratus	Black swan	6.7.8	Y	B	No
Cygnus olor (introduced)	White swan	6 Northam only		B	No
Tadorna tadoroides	Australian shelduck	1,2,5,6,7,8	X	B	Wo, Me, No
Anas superciliosa	Pacific black duck	1,2,5,6,7,8	X	B	No
Anas gibberifrons	Grey teal	1,5,6,7,8	X	B	No
Anas castanea	Chestnut teal	6,7,8	Z		
Anas rhynchotis	Australasian shoveler	6,7	Y	B	
Malacorhynchus membranaceus	Pink-eared duck	6,7,8	Y	B	
Aythya australis	Hardhead	6,7	X	B	
Chenonetta jubata	Maned duck	1,2,5,6	X	B	
Oxyura australis	Blue-billed duck	6,7	X	B	
Biziura lobata	Musk duck	6,7	Y	B	
Elanus notatus	Black-shouldered kite	1,2,5,6	X	B	Me,No
Milvus migrans	Black kite	5,6 Irrupt	Z		
Hamirosta melanosternon	Black-breasted buzzard		Rare		

Haliastur sphenurus	Whistling kite	1,2,3,5,6,7,8	Y	B	Me
Lophoictinia isura	Square-tailed kite	1,2,3,4	Y	B	St
Accipiter fasciatus	Brown goshawk	1,2,3,5,6	X	B	Wo,Me,No
Accipiter cirrocephalus	Collared sparrow-hawk	1,2,3,4,5,6	Y	B	St
Aquila audax	Wedge-tailed eagle	1,2,3,4,5,6	Y	B	Wo,Me
Hieraaetus morphnoides	Little eagle	1,2,3,5,6	X	B	Me,St
Circus assimilus	Spotted harrier	1,2,4,5	Y (E)	B	
Circus aeruginosus	Marsh harrier	5,7,	Z		
Falco peregrines	Peregrine falcon	1,2,5,6,7	Z	B	
Falco longipennis	Australian hobby	1,2,3,56,7	Y	B	Wo,Me,No
Falco hypoleacos	Grey falcon		Rare		
Falco berigora	Brown falcon	1,2,3,4,5	X	B	Wo,Me,St,No
Falco cenchroides	Australian kestrel	1,2,5,6	X	B	Wo,Me,St,No
Coturnix novaezealandiae	Stubble quail	1,5,6	X	B	No
Coturnix australis	Brown quail	5,6,7	Z		
Turnix varius	Painted button-quail	1,2,3,4	X	B	Wo,St
Turnix velox	Little button-quail	1,2,5 Irrupt	X	B	Me
Rallus philippensis	Buff-banded rail	5,6,7	Y	B	
Porzana pusilla	Baillon's crake	6,7,8	Y	B	
Porzana fluminea	Australian crake	6,7	Z		
Gallinula ventralis	Black-tailed native-hen	5,6,7,8,Irrupt	Y	B	
Gallinula tenebrosa	Dusky moorhen	6,7	Y(W)	B	No
Porphyrio porphyrio	Purple swamp hen	6,7	Z(W)		
Fulica atra	Eurasian coot	6,7,8	X	B	No
Ardeotis australis	Australian bustard	4,5	Rare		
Burhinus magnirostris	Bush thick-knee	1,2,5	Y	B	
Vanellus tricolor	Banded lapwing	5,7,8	X	B	
Erythrogonys cintus	Red-kneed dotterel	7,8	Z	B	
Charadrius rufficapillus	Red-capped plover	7,8	Z(E)		
Charadrius melanops	Black-fronted plover	5,6,7	X	B	No
Peltohyas australis	Inland dotterel	5,Irrupt	Z(E)	B	
Himantopus himantopus	Black-winged stilt	6,7,8	X	B	No
Cladorhynchus leucocephalus	Banded stilt	6,7,8	Z(E)		
Recurvirostra novaehollandiae	Red-necked avocet	6,7,8	Y(E)		
Tringa glareola	Wood sandpiper	6 Migrant	Z		
Tringa hypoleucos	Common sandpiper	6,7 Migrant	X		No

Tringa nebularia	Greenshank	6,7,8 Migrant	Z		
Calidris acuminata	Sharp-tailed sandpiper	7,8 Migrant	Z		
Calidris rufficollis	Red-necked stint	7,8 Migrant	Z		
Larus novaehollandiae	Silver gull	6,7,8	Z		No
Childonias hybrid	Whiskered tern	6,7,8,Irrupt	Z		
Gelochelidon nilotica	Gull-billed tern	6,7,8,Irrupt	Z		
Columba livia (introduced)	Feral pigeon	1,2,5	X	B	No
Streptopelia senegalensis (int)	Laughing turtle-dove	1,2,5,6	X	B	Me,No
Geopelia cuneata	Diamond dove	1,6 Irrupt	Z	B	
Phaps chalcoptera	Common bronze-wing	1,2,3,4,5	X	B	Wo,St
Phaps elegans	Brush bronze-wing	2,3	Z(S/W)		
Ocyphaps lophotes	Crested pigeon	1,2,5	X	B	Wo,Me,No
Calyptorphynhus magnificus	Red-tailed Black cockatoo	2,3,4	Z(W)		
Calyptorphynhus baudinii	White-tailed Black cockatoo	2,3,4,5	X		Wo,St
Cacatua roselcapilla	Galah	1,2,5	X	B	Wo,Me,No
Cacatua sanguinea pastinator	Little corella (long-billed form)	1,3,5,6	X(E)	B	Wo,No
Cacatua galerita (introduced)	Sulphur-crested cockatoo	1,2,5	Z	B	Wo
Glossopsitta porphyrocephala	Purple-crowned lorikeet	1,2,3	Y	B	Wo,St
Polytelis anthopeplus	Regent Parrot	1,2,3,5	Z		Me
Nymphicus hollandicus	Cockatiel	1,2,5 Irrupt	Z(E)		
Melopsittacus undulates	Budgerigar	1,2,5 Irrupt	Z		Me
Purpureicephalus spurius	Red-capped parrot	2,3	X(W)	B	St
Platycercus icterotis	Western rosella	2,3	Y(W)		
Bandardius zonarius	Port Lincoln ringneck	1,2,3,4,5,6	X	B	Wo,Me,St,No
Psephotus varius	Mulga parrot	1,2	Y(E)		Me
Neophema elegans	Elegant parrot	1,2,3,5	X	B	Wo,Me,St
Cuculus pallidus	Pallid cuckoo	1,2,3,4,5,6 Migrant	X		
Cuculus pyrrhophanus	Fan-tailed cuckoo	1,2,3,4,6 Migrant	X	B	Wo
Chrysococcyx osculans	Black-eared cuckoo	1,5	Z(E)		
Chrysococcyx basalis	Horsfield bronze-cuckoo	1,2,4,6 Migrant	X	B	Wo,Me,St
Chrysococcyx lucidus	Shining bronze-cuckoo	1,2,3,4,6 Migrant	X	B	Wo,Me,St,No
Ninox novaeseelandiae	Southern boobook	1,2,3,5,6	Y	B	Wo,Me,St
Ninox connivens	Barking owl	Rare	Rare		
Tyto alba	Barn owl	1,2,3,5,6	X	B	Wo
Tyto novaehollandiae	Masked owl	2	Z		
Podargus strigoides	Tawny frogmouth	1,2,3,5,6	Y	B	Me,St

Aegotheles cristatus	Australian owlet-nightjar	1,2,6	Y	B	St
Caprimulgus guttatus	Spotted nightjar	1,2,5	Z(E)		
Apus pacificus	Fork-tailed swift	1,5,6 Irrupt	Z		
Dacelo novaeguineae (introduced)	Laughing kookaburra	1,2,3,5,6	X	B	Wo,St,No
Halcyon pyrrhopygia	Red-backed kingfisher	1,2,4	Z(E)	B	Me
Halcyon sancta	Sacred kingfisher	1,2,3,5,6 Migrant	X	B	Wo,Me,No
Merops ornatus	Rainbow bee-eater	1,2,3,4,5,6,7 Migrant	X	B	Wo,Me,St,No
Cheramoeca leucosternum	White-backed swallow	4,5	X(E)	B	Wo,Me
Hirundo neoxema	Welcome swallow	5,6,7,8 Buildings	X	B	Me,No
Cecropis nigricans	Tree martin	1,2,3,4,5,6,7,8	X	B	Wo,Me,St,No
Cecropis ariel	Fairy martin	1,2,5 Migrant	X(E)	B	
Anthus novaeseelandiae	Richard's pipit	5	X	B	Wo,Me,St
Coracina novaehollandiae	Black-faced cuckoo-shrike	1,2,3,4,5,6	X	B	Wo,Me,St,No
Coracina maxima	Ground cuckoo-shrike	1,5	Rare		
Lalage sueurii	White-winged triller	1,2,3,4,5,6 Migrant	X	B	Wo,Me,St,No
Drymodes brunnoepygia	Southern scrub-robin	2	Rare(E)		Wo
Petroica multicolour	Scarlet robin	1,2,3,6	X(W)	B	Wo,St
Petroica goodenovii	Red-capped robin	1,3,4,5,6	X	B	Wo,Me,St,No
Melanodryas cucullata	Hooded robin	1,2,5	Z		
Eopsaltria griseogularis	Western yellow robin	2,3	X(W)	B	Wo,St
Microeca leucophaea	Jacky winter	1,2	Z	B	Wo
Falcunculus frontatus	Crested shrike-tit	2,3	Z(W)		
Pachycephala pectoralis	Golden whistler	2,3	Y(W)	B	St
Pachycephala rufiventris	Rufous whistler	1,2,3,4,5,6	X	B	Wo,Me,St,No
Colluricincla harmonica	Grey shrike-thrush	1,2,3,4,5,6	X	B	Wo,Me,St,No
Oreoica gutturalis	Crested bell-bird	1,2,4	Z(E)		Me
Myiagra inquieta	Restless flycatcher	1,2,5,6,7	Z	B	
Rhipidura fuliginosa	Grey fantail	1,2,3,4,5,6,7	X	B	Wo,Me,St,No
Rhipidura leucophrys	Willie Wagtail	1,2,3,4,5,6,7	X	B	Wo,Me,St,No
Pomatostomus superciliosus	White-browed babbler	1,2,4	X	B	Wo,Me,St
Acrocephalus stentoreus	Clamorous reed-warbler	Reed Beds 7 Migrant	Y	B	
Megalurus gramineus	Little grassbird	Reed Beds 7 Migrant	Y	B	
Cinclorhamphus mathewsi	Rufous songlark	1,2,5 Migrant	X	B	Wo,Me,St
Cinclorhamphus cruralis	Brown songlark	5 Migrant	X	B	Wo,Me,St
Malurus splendens	Splendid fairy-wren	1,2,3,4,6	X	B	Wo,Me,St
Malurus pulcherrimus	Blue-breasted fairy-wren	2,4	Z(S/W)		

Malurus leucopterus	White-winged fairy-wren	1,2,4	Y(E)	B	Wo,Me
Sericornis fuliginosus	Calamanthus	2,4	Z(E)		Wo
Sericornis frontalis	White-browed scrubwren	2,3,4	Z(S/W)		
Smicrornis brevirostris	Weebill	1,2,3,6	X	B	Wo,Me,St,No
Gerygone fusca	Western gerygone	1,2,3,6	X	B	Wo,Me,St,No
Acanthiza apicalis	Inland thornbill	1,2,3,6	X	B	Wo,Me,St
Acanthiza uropygialis	Chestnut-rumped thornbill	1,3,6	Y(E)	B	Me
Acanthiza inornata	Western thornbill	1,2,3,4,6	X(W)	B	Wo,St
Acanthiza chrysorrhoa	Yellow-rumped thornbill	1,2,3,4,5,6	X	B	Wo,Me,St,No
Daphoenositta chrysoptera	Varied sittella	1,2,3	X	B	Wo,Me,St
Climacteris rufa	Rufous tree-creeper	1,2,3	X	B	St
Anthochaera camnculata	Red wattlebird	1,2,3,4,6	X	B	Wo,Me,St,No
Anthochaera chrysoptera	Little wattlebird	1,2,3,4	X(W)	B	St
Acanthagenus rufogularis	Spiny-cheeked honeyeater	1,3,4	Z(E)		Me
Manorina flavigula	Yellow-throated miner	1,2,4	X(E)	B	Wo,Me,St,
Lichenostomus virescens	Singing honeyeater	1,2,3,4,5	X	B	Wo,Me,St,No
Lichenostomus leacotis	White-eared honeyeater	2,4	Z(N/E)		
Lichenostomus ornatus	Yellow-plumed honeyeater	1,2,3	X	B	Wo
Melithreptus brevirostris	Brown-headed honeyeater	1,2,3,4,6	X	B	Wo,Me,St,No
Melithreptus lunatus	White-naped honeyeater	2,3	X(W)	B	Wo,St
Lichmera indistincta	Brown honeyeater	1,2,3,4,6	X	B	Wo,Me,St,No
Phylidonyris albifrons	White-fronted honeyeater	1,2,4 Irrupt	Z(E)	B	Wo
Phylidonyris novaehollandiae	New Holland honeyeater	2,3,4	X(W)	B	Wo,Me,St
Phylidonyris niger	White-cheeked honeyeater	2,3,4	Y(W)		Wo,ST
Phylidonyris melanops	Tawny-crowned honeyeater	1,2,3,4	X	B	Wo,ST
Acanthorhynchus superciliosus	Western spinebill	2,3,4	X(W)	B	Wo,ST
Ephthianura tricolor	Crimson chat	2,4,5 Irrupt	Z(E)	B	Wo
Ephthianura albifrons	White-fronted chat	4,5,7,8	X	B	Wo,Me,St
Dicaeum hirandinaceum	Mistletoe bird	1,2,3,4,6	X	B	Wo,Me,St,No
Pardalotus punctatus	Spotted pardalote	12,3	Y(W)		
Pardalotus striatus	Striated pardalote	1,2,3,6	X	B	Wo,Me,St
Zosterops lateralis	Silver-eye	1,2,3,4,6	X	B	Wo,No
Poephila guttata	Zebra finch	1,2,4,5,6	X(E)	B	Wo,Me,St
Grallina cyanoleuca	Australian magpie-lark	1,2,3,5,6,7	X	B	Wo,Me,St
Artamus personatus	Masked woodswallow	1,4,5 Irrupt	Z	B	
Artamus cinereus	Black-faced woodswallow	1,2,4,5	X	B	Wo,Me,St,No

Artamus cyanopterus	Dusky woodswallow	2,3	X	B	St
Cracticus torguatus	Grey butcherbird	1,2,3,4,5,6	X	B	Wo,Me,St
Cracticus nigrogularis	Pied butcherbird	1,2,4,5	Y(E)	B	Me
Gymnorhina tibicen	Australian magpie	1,2,3,4,5,6,7	X	B	Wo,Me,St,No
Strepera versicolour	Grey currawong	1,2,3	Z()		
Corvus coronoides	Australian raven	1,2,3,4,5,6,7,8	X	B	Wo,Me,St,No
Corvus bennetti	Little crow	1,2,5 Migrant	Y		

Other Animals

Lists of other animals, given in this book, are fairly complete for each particular group so far as is known. However, very little is known of their way of life in the Avon Valley except that they are more confined to particular habitats, not moving as freely as birds do, therefore most are potentially more endangered.

With the exception of the few that have been studied for their immediate economic and human significance, there are many others of whose living habits here nothing whatever is known. So this unknown world of many creatures is still waiting to be explored.

From the micro fauna to the arthropods - such as spiders and insects - only some butterflies, found locally, are listed and they probably represent one of the smallest groups of fauna here in the Valley.

The Vertibrates

Best known are the large Vertebrate animals.

Monotreme/Marsupial

The Echidna or Spiny anteater - a monotreme - is quite common in virgin bushland and on many farms, as are some marsupials such as the Grey kangaroo and, where extensive hilly and rocky country exists, the Euro kangaroo. Throughout the Avon Valley the Black- gloved wallaby maintains populations in forest country containing dense areas of scrub under-storey.

Unlike most birds, snakes and lizards, nearly all these other animals are active at night and therefore not easily seen. This is particularly so of marsupials, bats and rodents (both native and introduced) as well as feral cats, rabbits and foxes. However, the last three animals and the Kangaroos can often be seen in daytime, particularly at early morning or evening.

The forest, rock outcrops and the river forest are their headquarters, many coming into the more open farmlands and roadsides at night. Others are found only after considerable effort; or they may be chanced upon, seeing them being the occasional bonus of a bushland ramble.

The tiny Pygmy possum, the Honey possum and particularly the Brush- tailed possum, are often found. The latter ranges over the whole area, the others usually in the west. The Brush-tailed phalanger has been recorded very recently in both the central and western farmland.

The three insect-eating Dunnarts are likely to be found, throughout, in bushland and stony country. The Tammar wallaby, Short-nosed bandicoot. Western native cat and Ring-tailed possum now appear rare in the western forest areas. There have been only odd sightings in the last twenty-five years.

Marsupials known to have disappeared are the Pig-footed bandicoot and Western barred bandicoot (last recorded in the 1940s) and the Banded hare- wallaby (1870s) with 'Boodie rats', the Burrowing bettong (1890s), Black-footed rock wallaby (1920s), Dalgite or Long eared bandicoot (1930s) with perhaps the Numbat in the 1950s (it was last reliably reported then in the Julimar Forest).

This animal, the Numbat, was first seen by Dale and Moore near the Yenyenning Lakes in 1831. It is now the State's animal emblem. Unfortunately it is nearing extinction everywhere in its restricted and now modified habitat - usually Wandoo forest. It lives almost exclusively on termites and other small fauna of rotting wood and other forest litter. It is a terrestrial animal and does not climb trees except sloping ones. Its food is much the same as that of the Echidna. However it is not a large or strong animal well protected by spines as tie Echidna is and is unable to break open termite mounds so is restricted to finding its food by overturning rotting wood and Litter on the ground surface. Most shelters and sites for rearing the young are in fallen logs and branches or in holes under them.

These requirements do not accord with repeated and extensive burning of woodland such as has been practised for many years now. This has apparently deprived the animal, not only of adequate food supplies, but also of protection from those very agile introduced predators, the fox and cat.

Placental

The last two named animals are placental predators and they have almost entirely replaced the Native cat and Dingo. The latter, thought to have reached Australia about ten thousand years ago, no longer exists, locally, as a true sub-species of dog. The last true Dingo known between Northam and Toodyay is said to have been killed near the river in 1907. 'Wild dogs' still appear in the forest land of the Helena River basin and feral pigs also occur there.

The bats are native placentals. Though frequently seen about gardens and homes - the Littte mastiff bat and Gould's wattled bat occasionally coming through open windows at night - a study of the local bats has not been done in detail. All of them are harmless to man. Having few caves to sleep in during the day time, they may be found either in hollow trees, or under very large pieces of flaking dead bark on their trunks. The river, other areas of water, and the forest provide their main havens.

The introduced House mouse and the Black rat are rodents commonly seen. Western bush rats and Water rats are native species which exist in very small numbers near the Avon River, and appear scarce everywhere, though both will enter drier country and could exist in a number of other places.

Fish

The fish of the Avon are a mixture of native and introduced species, the common ones being tiny creatures. It is regrettable that the native freshwater Cobbler, a good eating fish formerly common, is now rare. The Avon is no anglers’ paradise! Carp and Perch species introduced to the river about 1900, had died out by 1945 due to increasing salinity of the water, though farmers maintain such fish in a few dams. Others have tried Trout and Marron (a crustacean) though the two are not compatible if in the same dam. The Western minnow at times becomes common in the pools of small creeks.

INVERTEBRATES

As mentioned earlier, the so-called 'lower’ orders of invertebrates and their way of life have virtually not been studied here. But in reality, they, and all the plants, provide the base on which the life of the much better known and more easily recognisable animals depend.

Molluscs and Crustaceans

The few molluscs and crustaceans of the Avon River are interesting historically, since the numbers of these animal species have varied in recent years with the rapid changes in water salinity. None is a new species and none is known to have disappeared totally, some remaining in at least a few pools.

The dominant species now in the saline, formerly fresh water pools, are those that either came up river from the coastal estuary or down river from the inland salt lakes.

They were obviously pre-adapted to living in a river very changeable in nature.

Most land snails and all slugs are introduced species.

Butterflies: complex inter-relationships of living things

The only insects listed are butterflies. The whole region of south-western Australia hasn't very many species and this might indicate that they are, probably, among the least important elements in the ecology of the local wildlife.

Among the few species of interest found in the Avon Valley are two of wide Australian distribution. These are: the Satin azure, a small intensely blue creature, seen around flowering mistletoe mostly in December and January, and the larger Wood white - white with black edging blotches with red areas on the underwing - which is seen about tree tops and in the garden for a longer period of the year.

These butterflies are part of a complex four-part association of existence between them, the parasitic mistletoe, a bird and several species of ants. The host tree supporting the mistletoe is not included since it could possibly function without the others.

The story of this association is complex and may vary in detail in different parts of Australia. Suffice it to say that the Mistletoebird eats the berries of the Mistletoe plant, afterwards voiding the fertile seeds they contain. The bird has a specialised and simplified stomach, without a gizzard, which allows the seeds to remain sticky and fertile. Many seeds are deposited on the branches of the host tree and there grow, in about two years, into flowering clumps of mistletoe. One host is the Sandalwood, itself a root parasite of other plants.

Jam trees and river sheoak are common local hosts and the same bird places other species of mistletoe on Eucalyptus and Sandalwood trees.

The butterflies help fertilize the flowers of, and feed and lay their eggs on, the mistletoe where the eggs hatch into caterpillars (larvae). Certain species of ants live happily with the larvae, accepting them into their nests under bark or on the ground below, and never harming them. Apparently these ants obtain some food excretions from the larvae - who when the time to pupate arrives, still remain in the ants' nest if they are larvae of the Azure butterfly.The larvae of the Wood-white, however, leave the ants at this stage and spin a web on twigs in which to pupate. In due course the butterflies appear, before the mistletoe flowering time.

Life appears slightly complicated for this group of flora and fauna, though probably not much more so than for most others in the bush.

Mammals and other Animals - Records since 1975

Status:

X = Common	Y = Uncommon	Z = Scarce
B = Breeding bird	E = East mostly	W = West mostly

Mammal Monotreme		
Tachyglossus aculeatus	Echidna	X
Mammal - Marsupial		
Macropus fuliginosus	Western grey Kangaroo	X
Macropus robustus	Euro	Y
Macropus irma	Western brushWallaby	Y
Macropus eugenii	Tammar wallaby	
Trichosurus vulpecula	Common brushtail possum	X
*Pseudocheirus occidentalis*Western ringtail possum	Rare	
Cercartetus concinnus	Western pygmy-possum	Y
Tarsipes rostratus	Honey possum	Y West
Isoodon obesulus	Southern brown bandicoot	
Antechinus flavipes	Yellow-footed antechinus	
Dasyurus geoffroii	Western quoll (native cat)	Z West
Phascogale tapoatafa	Brush-tailed phascogale	Z
Sminthopsis crassicaudata Fat-tailed dunnart	Z	
Sminthopsis granulipes	White-tailed dunnart	
Sminthopsis murina	Common dunnart	Y
Mammal - Placental - Bats		
Chalinolobus gouldii	Gould's wattled bat	X
Chalinolobus morio	Chocolate wattled bat	
Eptesicus regulus	Southern Forest Bat (King River Bat)	
Tadarida australis	White-striped mastiff-bat	
Mormopterus planiceps	Little mastiff-bat	X
Taphozous flaviventris	Yellow-bellied sheathtail bat	
Taphozous georgianus	Common sheathtail bat	
Nyctophilus geoffroii	Lesser-eared bat	
Rodents		
Rattus fuscipes	Western bush rat	Z
Hydromys chrysogaster	Water rat	Z
Mus musculus (introduced)	House mouse	X
Rattus rattus (introduced)	Black rat	X\
Other Introduced Mammals		
These have extensively modified the former natural ecosystems		
Felis catus	Cat	X feral
Vulpes vulpes	Red fox	X feral
Canis familiaris	Dog-dingo	Z feral
Oryctolagus cuniculus	European rabbit	X feral

Fish - Native Species		
Primary inland species	**Permanent species of inland streams**	
Galaxias occidentalis	Western minnow	Often common fresh and brackish water
Tandanus bostocki	Freshwater cobbler	Scarce, once common, Avon & Dale Rivers
Bostockia porosa	Nightfish	Uncommon fresh to brackish water
Edelia vittata	Western pygmy perch	Uncommon fresh to brackish water
Secondary Species	**A significant part of their life cycle occurs in estuaries**	
Aldrichetta forsteri	Yellow-eyed mullet	(Unusual. Will come up river during floods.
Mugil cephalus	Mangrove mullet	(Disappear after about (one year
Pseudogobius olorum	Swan River goby	At times common, Avon
Atherinosoma presbyteroides	Hardyhead	Occasional
Introduced Species		
Salmo trutta	Brown trout	In a few farm dams
Gambusia affinis	Mosquito fish	At times common. Fresh and brackish water
Perca fluviatilis	Redfin perch	A few farm dams. Will breed
Leiopotherapon unicolor	Spangled perch	A few farm dams. Breeds freely
Carassius auratus	Goldfish	With both *Carassius A* few in dams
Carassius carassius	Crucian carp	Extinct in Avon since the 1950s

Invertrebrates

Molluscs

Westralunio carteri	Large river clam. Freshwater	Rare
Fluviolanatus subtorta	Small river clam. Brackish water	X
Hydrobia sp	Tiny snail. Dams. Freshwater	Rare
Coxiella glabra	Small snail. Salt lake & river	Y
Thiara incerta	Small spiral snail. River	Y
Physastra sp.	Small snail. Freshwater	Rare
Austrosuccinea sp.	Small snail. Winter moist areas	Y

Introduced Species

Physa sp.	Snail. Dams, freshwater	
Milax gagates	Slug. Garden and field	X
Deroceras reticulates	Slug. Garden	X
Deroceras caruanae	Slug. Garden	X
Helix aspersa	European brown snail. Garden	X

CRUSTACEA

Cherax quinquencarinatus	Jilgie. Fresh & brackish water	X
Cherax glaber	Koonac. Fresh & brackish water	Y
Palaemonetes australis	Shrimp. Brackish & salt water	X

Introduced Species

Cherax albidus-destructor	Yabbies. Dams, freshwater	
Cherax tenulamanus	Marron. Dams, freshwater	

Insects- Butterflies

Papilio demoleus sthenelus	Chequered swallow tail	Migrant
Eurema hecabe phoebus	Common grass-yellow	
Delias aganippe	Wood-white	
Danaus plexippus plex	Butterfly, Wanderer	Migrant
Danaus chrysippus petilia	Butterfly, Lesser wanderer	Migrant
Geitoneura klugii klugii	Butterfly, Klug's xenica	
Geitoneura minyas minyas	Butterfly, Western xenica	
Junonia villida calybe	Butterfly, Meadow argus	Migrant
Vanessa kershawk	Butterfly, Australian painted lady	Migrant
Vanessa itea	Butterfly, Australian admiral	
Ogyris amaryllis meridioalis	Butterfly, Satin azure	
Ogyris idmo	Butterfly, Large brown azure	
Erina hyacinthma simplexa	Butterfly, Western dusky blue	
Erina acasta	Butterfly, Blotched blue	
Zizeeria otislabradus	Butterfly, Common grass-blue	
Nacaduba biocellata	Butterfly, Double-spotted lineblue	
Pieris rapae	Butterfly, Cabbage white (introduced/appeared 1947)	

Flora

This list is not intended to be a complete catalogue of all the plants of the shires. It is intended to be a preliminary one, listing the obvious and common species. Names and their family groupings are according to the 'Census of the Vascular Plants of Western Australia' by Green (1984).

FAMILY	
Mimosaceae	*Acacia acuminata*
	A. barbinervis
	A. celastrifolia
	A. drummondii
	A. lasiocarpa
	A. microbotrya
	A. nervosa
	A. pulchella
	A. restiacea
	A. saligna
	A. urophylla
	A. willdenowiana
Apiaceae	*Actinotus leucocephalus*
Adiantaceae	*Adiantum aethiopicum*
Casuarinaceae	*Allocasuarina campestris*
	A. huegeliana
	A. humilis
	A. thuyoides
Haemodoraceae	*Anigozanthos bicolor*
	A. humilis
	A. manglesii
Centrolepidaceae	*Aphelia cyperoides*
	A. drummondii
	A. gracilis
Epacridaceae	*Astroloma ciliatum*
	A. compactum
	A. macrocalyx
	A. pallidum
Myrtaceae	*Calothamnus quadrifidus*
	C. rupestris
	C. sanguineus
	Catytrix angulata
	C.*fraseri*
	C. *glutinosa*
	C. variabilis
Casuarinaceae	*Casuarina obesa*
Centrolepidaceae	*Centrolepis aristata*
Anthericaceae	*Chamaescilla corymbosa*
Adiantaceae	*Cheilanthes austrotenuifolia*
Ranunculaceae	*Clematis pubescens*
Polygalaceae	*Comesperma calymega*
	C. volubile
Proteaceae	*Conospermum brownie*
	C. densiflorum
	C. *glumaceum*
	C. incurvum
Haemodoraceae	*Conostylis androstemma*
	C. aurea
	C, *candicans*
	C. caricina
	C. serrulata
	C. setigera
	C. setosa
Rhamnaceae	*Cryptandra arbutiflora*
Chloanthaceae	*Cyanostegia lanceolata*
Goodeniaceae	*Dampiera alata*
	D. cuneata
	D. lavandulacea
	D. lindleyi
	D, linearis
	D.teres
Papilionaceae	*Davesia decurrens*

	D. *hakeoides*
	D, horrida
	D. incrassata
	D. polyphylla
	D. preissii
Phormiacea	*Dianella divaricata*
Papilionaceae	*Dillwynia cinerascens*
Dioscoreaceae	*Dioscorea hastifolia*
Orchidaceae	*Diuris laxiflora*
	D. longifolia
	Drakaea elastica
	D, glyptodon
Droseraceae	*Drosera erythrorhiza*
	D. gigantea
	D. *leucoblasta*
	D, macrantha
	D, macrophylla
	D, menziesii
	D. pallida
	D, platystigma
	D. *stolonifera*
Proteaceae	*Dryandra armata*
	D. carduacea
	D. fraseri
	D. horrida
	D. kippistiana
	D. nivea
	D. nobilis
	D. polycephala
	D. praemorsa
	D. proteoides
	D. sclerophylla
	D.sessilis
	D. vestita
Orchidaceae	*Elythranthera brunonis*
	E. emarginata
Myrtaceae	*Eremaea pauciflora*
Rutaceae	*Eriostemon spicatus*
Myrtaceae	*Eucalyptus accedens*
	E. albida
	E. astringens
	E. calophylla
	E. camaldulensis
	E. drummondii
	E. foecunda
	E. macrocarpa
	E. marginata
	E. patens
	E. rudis
	E. salmonophloia
	E. transcontinentalis
	E. wandoo
Papilionaceae	*Gastrolobium calycinum*
	G. pulchellum
	G. spinosum
	G. villosum
Haloragaceae	*Glichrocaryon aureum*
Papilionaceae	*Gompholobium capitatum*
	G. knightianum
	G. marginatum
	G. shuttleworthii
	G. tomentosum
Goodeniaceae	*Goodenia filiformis*
Proteaceae	*Grevillea excelsior*
	G. pilulifera
	G. synapheae
	G. wilsonii

Haemodoraceae	*Haemodorum laxum*
	H. simplex
Proteaeeae	*Hakea incrassata*
	H. petiolaris
	H. ruscifolia
	H. undulata
Asteraceae	*Helichrysum bracteatum*
	H. leucopsideum
	H. lindleyi
	Helipterum cotula
	H. manglesii
Lamiaceae	*Hemiandra linearis*
	H. pungens
	Hemigenia sericea
Dilleniaceae	*Hibbertia acerosa*
	H. heugelii
	H. hypericoides
	H. lasiopus
	H. miniata
	H. montana
	H. pachyrrhiza
	H. polyclada
	H. rhadinopoda
Papilionaceae	*Hovea chorizemifolia*
	H. pungens
	H. trisperma
Hypoxidaceae	*Hypoxis occidentalis*
Isoetaceae	*Isoetes drummondii*
Proteaceae	*Isopogon divergens*
	I. dubius
Lobeliaceae	*Isotoma hypocrateriformis*
Papilionaceae	*Isotropis cuneifolia*
	Jacksonia alata
	J. densiflora
	J. floribunda
	J. sternbergiana
Papilionaceae	*Kennedia coccinea*
	K. prostrata
Sterculiaceae	*Keraudrenia hermanniaefolia*
Dasypogonaceae	*Kingia australis*
Myrtaceae	*Kunzea recurva*
Anthericaceae	*Laxmannia grandiflora*
Goodeniaceae	*Lechenaultia biloba*
	L. formosa
	L.laricina
	L. tubiflora
Cyperaceae	*Lepidosperma angustatum*
	L. longitudinale
Restionaceae	*Leptocarpus coangustatus*
Santalaceae	*Leptomeria pauciflora*
Myrtaceae	*Leptospermum ellipticum*
	L. erubescens
Epacridaceae	*Leucopogon nutans*
	L. polymorphus
Stylidiaceae	*Levenhookia pusilla*
	L. stipitata
Lobeliaceae	*Lobelia winfridae*
Restionaceae	*Loxocarya cinerea*
Juncaceae	*Luzula meridionalis*
Zamiaceae	*Macrozamia riedlei*
Myrtaceae	*Melaleuca radula*
	M. scabra
	M. uncinata
	M. undulata
Poaceae	*Neurachne alopecuroidea*
Solanaceae	*Nicotiana rotundifolia*
Loranthaceae	*Nuytsia floribunda*

Iridaceae	*Orthrosanthus multiflorus*
Scrophulariaceae	*Parentucetllia viscosa*
Iridaceae	*Patersonia babianoides*
	P. juncea
	P. rudis
	P. sericea
Proteaceae	*Persoonia elliptica*
	P. longifolia
	P. trinervis
	Petrophile biloba
	P. divaricata
	P. serruriae
	P. striata
Philydraceae	*Philydrella pygmaea*
Papilionaceae	*Phyllota sp.*
Chloanthaceae	*Physopsis spicata*
Thymelaeaceae	*Pimelea imbricata*
	P. preissii
	P. suaveolens
Poaceae	*Poa drummondiana*
Asteraceae	*Podolepis canescens*
	P. gracilis
	P. lessonii
Lentibulariaceae	*Polypompholyx multifida*
Orchidaceae	*Pterostylis nana*
	P.rufa
	P. vitiata
Arnaranthaceae	*Ptilotus drummondii*
	P. *manglesii*
Papilionaceae	*Pultenaea dasyphylla*
Santalaceae	*Santalum acuminatum*
Goodeniaceae	*Scaevola glandulifera*
	S. longifolia
	S. platyphylla
Asteraceae	*Senecio hispidulus*
	S. lautus
Anthericaceae	*Sowerbaea laxiflora*
Orchidaceae	*Spiculaea ciliata*
Stackhousiaceae	*Stackhousia brunonis*
	S. huegelii
	S. pubescens
Proteaceae	*Stirlingia latifolia*
Stylidiaceae	*Stylidium amoenum*
	S. brunonianum
	S. calcaratum
	S. caricifolium
	S. carnosum
	S. ciliatum
	S. despectum
	S. diuroides
	S. hispidum
	S. junceum
	S. pulchellum
	S. *pycnostachyum*
	S. schoenoides
Phormiaceae	*Stypandra grandiflora*
Epacridaceae	*Styphelia tenuiflora*
Proteaceae	*Synaphea petiolaris*
Papilionaceae	*Templetonia drummondii*
	T. smithiana
Tremandraceae	*Tetratheca hirsuta*
	T. viminea = T. hirsuta
	T. nuda
Stylidiaceae	*Thomasia foliosa*
	T, glutinosa
	T. pauciflora
Myrtaceae	*Thryptomene sp.*

Anthericaceae	*Thysanotus multiflorus*
	T. patersonii
	T. thyrsoideus
Apiaceae	*Trachymene ornata*
Haemodoraceae	*Tribonanthes uniflora*
Anthericaceae	*Tricoryne elatior*
Juncaginaceae	*Triglochin procera*
Rutaceae	*Urocarpus grandiflorus*
Myrtaceae	*Verticordia acerosa*
	V. brownii
	V. chrysantha
	V. heugelii
	V. nitens
	V. picta
	V. plumosa
	V. serrata
Papilionaceae	*Viminaria juncea*
Asteraceae	*Waitzia aurea*
	W. citrina
	W. paniculata
	W. suaveolens
Xanthorrhoeaceae	*Xanthorrhoea gracilis*
	X. nana
	X. preissii
	X. reflexa
Proteaceae	*Xylomelum angustifolium*

Wongamine Fungi

List 1984

Agaricus sp. (Bush mushroom)
Amanita sp. (White with ring)
Amanita xanthocephala
Calostoma luridum (Pretty Mouths)
Clitocybe sp.
Coprinus sp.
Corioius versicolor
Cortricia dependens
Coltricia oblectans (aff. cirnnamomea)
Cortinarius erythraeus
Geatrum sp.
Gymnopilus sp.
Laccaria laccata
Leptonia sp. (brown sheen on cap)
Lopharia crassa
Lycoperdon glabrescens
Panus fasciatus
Paxillus muelleri
Peziza austrogeaster
Peziza vesiculosus
Peziza sp. (black)
Piptoporus portentosus
Pisolithus tinctorius
Pycnoporus coccineus
Ramaria stricta (a Coral fungus)
Ramaria ochraceo (salmonicolor)
Russula floctonae
Russula marei
Secotium melanosporum
Stereum hirsutum
Stropharia semiglobata
Tremella mesenterica
Tremelloscypha australiensis
Tubaria rufo-fulda
Tulostoma (2 species)

Bibliography

General History

CROSS, J.
Journals of several expeditions made in Western Australia, 1833 (Tas. ed.)
University of W.A. Press, 1980.

ERICKSON, R.
Old Toodyay and Newcastle. Toodyay Shire Council, 1974.

GARDEN, D.S.
Northam: An Avon Valley History. Northam Town and Shire Councils, 1979.

LEFROY, H.M.
Journal of Henry Maxwell Lefroy (1863). (Exploration) Battye Library, Perth.

MOORE, G.F.
Diary of Ten Years of an Early Settler in Western Australia. (1830-1839). 1894 (Tas. ed,) University of W.A. Press, 1979.

MORGAN, WJ.
Diary of William John Morgan (1864-1894). Battye Library, Perth.

V1VEASH, S.W.
Diary of Samuel Waterman Viveash (1839-1863). Battye Library, Perth, and conversations with Richard H. Smith, Lionel W. Viveash, George Jessup, Charles Masters and Lionel Lloyd.

Natural Sciences - General to Avon Valley

CASPERSON, K.D.
Toodyay; A survey of major habitats within the Shire. Toodyay Shire Council, 1975.

KENDRICK, G.W.
The Avon: Fauna and other notes on a dying river in South Western Australia. The W.A. Naturalist Vol. 13-5,1976.

MALCOLM, C.V.
Saltland and what to do about it W.A, Department of Agriculture Journal, 1978.

MOORE. A., et al
Naure Reserves of the Shire of Toodyay. W.A.
Department of Fisheries and Widlife, 1984

MOORE, S., WILLIAMS, A.
Naure Reserves of the Shire of York and Northam. Draft Plan.
Department of Conservation and Land Management, 1986

MULCHY, M.J. et al
Landforms and Soils on an Uplifted Peneplain of the Darling Range, W.A.
Australian Journal of Soil Research, 10: 1-14, 1972

SINCLAIR, R., SMITH, V.
A Baseline Study of the Avon River around Toodyay
School of Environmental and Life Sciences, Murdoch University (Dec.) 1980

Natural History of Toodyay. Toodyay Naturalists' Club, 1979

WHITTINGTON H.S.
A Battle for Survival Against Salt Encroachment at "Springhill", Brookton
1975

WILDE. S.A., LOW G.H.
W.A. Geological Society 1:250,000 Geological Sheet and Survey.
Perth, W.A. 1978

Natural Sciences - Specific to Flora and Fauna

Flora

BAINS, J.A.
Australian Plant Genera. Surrey Beatty & Sons Pty. Ltd. 1981

BLACKALL, W.E., GRIEVE, B.J.
How to knowWestern Australian Wildflowers I, II, III, V, VI
University of W.A. Press

CARR, D.J. S.G.M. Eds.
People and Plants in Australia. Academic Press, 1981

ERICKSON, R., et al.
Flowers and Plants of Western Australia. Reed, 1973.

GREEN, J.W.
Census of the Vascular Plants of Western Australia. 2nd Ed. Gov. Printers,
Perth. 1985.

GRIFFITHS. K.,
A field guide to the larger fungi of the Darling Scarp and South West of Western Australia, Kevn Griffiths {1985).

PATE, J.S., BEARD J.S. Eds.
Ktuatiffan. Plant Life of the Sandplain. University of W.A. Press, 1984.

Birds

BLAKERS, M.. et al.
The Atlas of Australian Birds. Melbourne University Press, 1984.

JENKINS, C.F.H.

Birds of Northern. The Emu 31:30-35 R.A.O.ll, 1931.
MASTERS J.R., MILHHCH, A.L.
Birds of the Shire ofNortham about 100 km east of Perth, W.A. The Emu
74:228-244 R.A.O.U., 1974.
PIZZEY, G.
A Field Guide to the Birds of Australia. Collins, 1980.
SERVENTY. D.L, WH1TTEL, H.M.
Birds of Western Australia. Lamb Publications, 1967.
Other Animals
ALLEN, G.R.
A Field Guide to Inland Fishes of W.A. Western Australian Museum, 1982.
COMMON, I.F.B., WATERHQUSE, D.F. *Butterflies of Australia.*
A&R, 1982.
GOODE, J.
Insects of Australia. A&R, 1980.
STRAHAN R., Ed.
The Australian Museum: Complete Book of Australian Mammals. A&R,
1983.
Fauna - Reptiles and Amphibians
GREEN, J.W.
Census of the Vascular Plants of Western Australia. 2nd Ed. Gov. Printers, Perth. 1985,
GRIFFITHS, K.,
.4 *field guide* to *the larger fungi of the Darling Scarp and South West of Western Australia,* Kevn Griffiths (1985).
PATE, J.S., BEARD IS. Eds.
Kwongan. Plant Life of the Sandplain, University of W.A. Press, 1984.
Birds
BLAKERS. M., et al
The Atlas of Australian Birds. Melbourne University Press, 1984.
JENKINS, C.F.H.
Birds Of Northern. The Emu 31:30-35 R.A.O.U., 1931.
MASTERS J.R., MILHINCH, A.L.
Birds, of the Shire of Northam about 100 km east of Perth, W.A. The Emu 74:228-244 R.A.O.U.. 1974.
PIZZEY, G.
A Field Guide to *the Birds of Australia.* Collins, 1980.
SERVENTY, D.L., WH1TTEL, H.M.
Birds of Western Australia, Lamb Publications, 1967.
Other Animals
ALLEN, G.R.
A Field Guide to Inland Fishes of WA. Western Australian Museum, 1982.
COMMON, I.F.B., WATERHOUSE, D.F. Butterflies of Australia.
A&R.1982.
GOODE, J.
Insects of Australia. A & R, 1980.
STRAHAN R., Ed.
The Austratian Museum; Complete Book of Australian Mammals, A & R. 1983.
Fauna - Reptiles and Amphibians
CHAPMAN, A., DELL, J
Biology and Zoogeography of the Amphibians of the WA. Wheat-belt, Western Australian Museum, 1985.
COGGER, H.B.
Reptiles and Amphibians of Australia. (Rev. ed.) Reed, 1983,
STORE, G,M.etal,
Lizards of Western Australia 3 Skinks. W.A. Museum, 1981.
STQRR.G.M.etal.
Lizards of Western Australia II Dragons and Monitors. W.A, Museum. 1981:
TYLER, MJ, etal,
Frogs of Western Australia. W.A. Museum, 1984.

Index

Chart 1

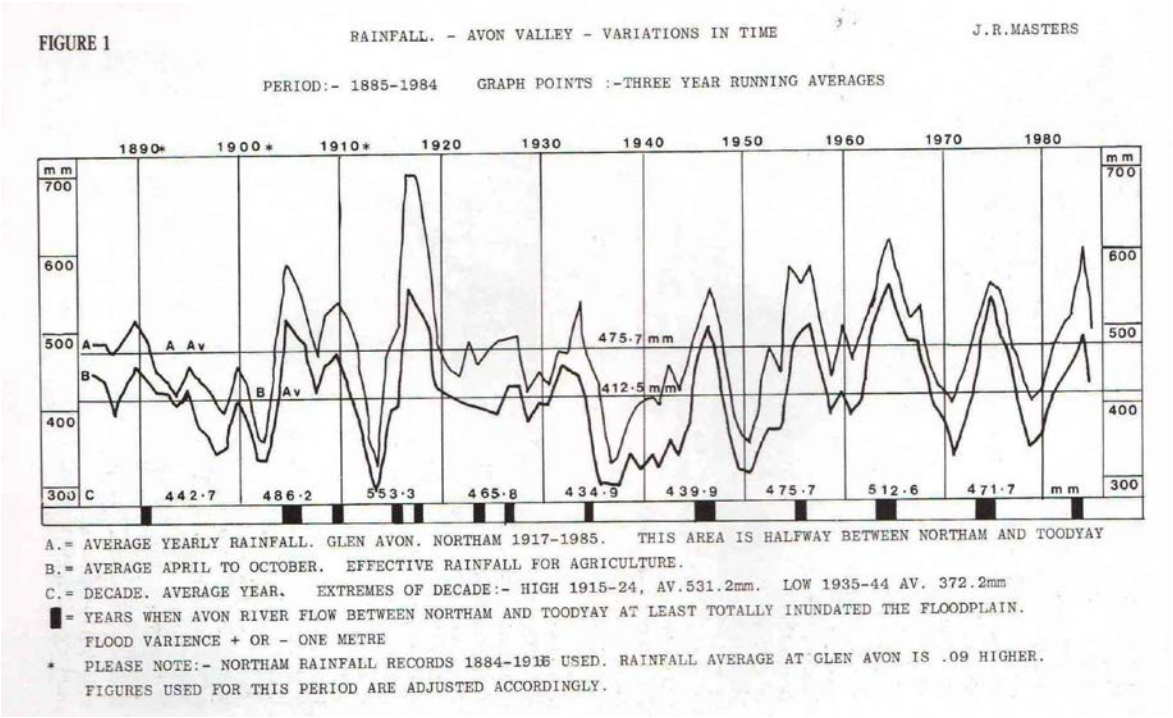
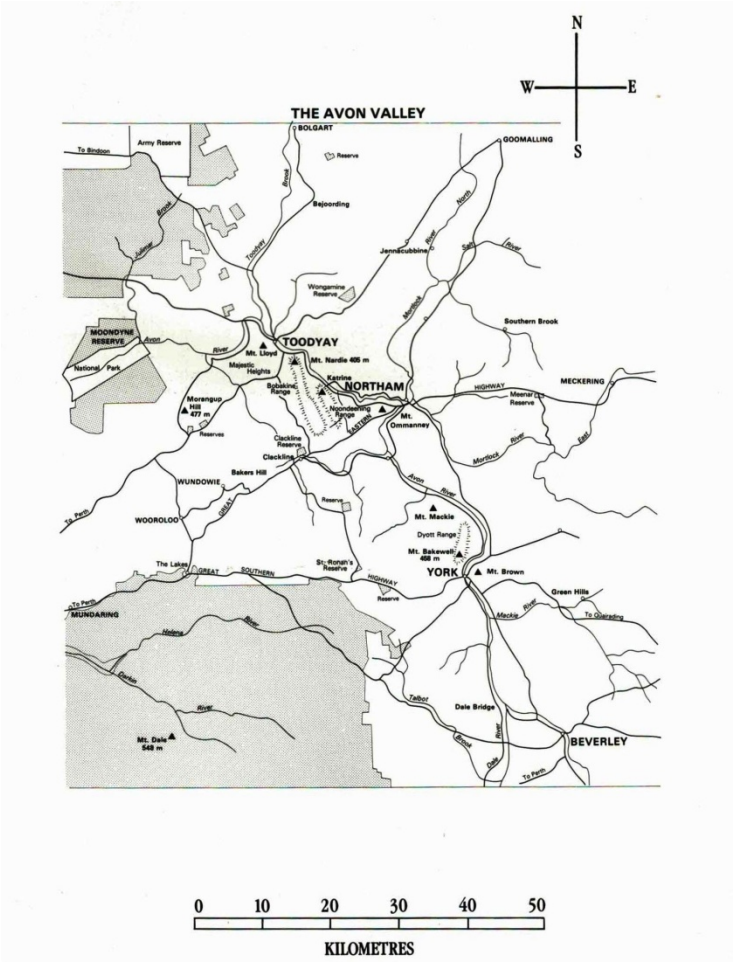


FIGURE 1
RAINFALL. - AVON VALLEY - VARIATIONS IN TIME
J.R.MASTERS
PERIOD:- 1885-1984 GRAPH POINTS :-THREE YEAR RUNNING AVERAGES
1890* 1900* 1910* 1920 1930 1940 1950 1960 1970 1980
mm
700
600
500
400
300
A
A Av
B
B Av
475·7 mm
412·5 mm
C
442·7 486·2 553·3 465·8 434·9 439·9 475·7 512·6 471·7 mm
A.= AVERAGE YEARLY RAINFALL. GLEN AVON. NORTHAM 1917-1985. THIS AREA IS HALFWAY BETWEEN NORTHAM AND TOODYAY
B.= AVERAGE APRIL TO OCTOBER. EFFECTIVE RAINFALL FOR AGRICULTURE.
C.= DECADE. AVERAGE YEAR. EXTREMES OF DECADE:- HIGH 1915-24, AV.531.2mm. LOW 1935-44 AV. 372.2mm
= YEARS WHEN AVON RIVER FLOW BETWEEN NORTHAM AND TOODYAY AT LEAST TOTALLY INUNDATED THE FLOODPLAIN.
FLOOD VARIENCE + OR - ONE METRE
* PLEASE NOTE:- NORTHAM RAINFALL RECORDS 1884-1916 USED. RAINFALL AVERAGE AT GLEN AVON IS .09 HIGHER.
FIGURES USED FOR THIS PERIOD ARE ADJUSTED ACCORDINGLY.

Map 2


N
W
E
S
THE AVON VALLEY
BOLGART
GOOMALLING
Army Reserve
To Bindoon
Bejoording
Jennacubbine
Wongamine Reserve
Southern Brook
MOONDYNE RESERVE
Avon River
National Park
Mt. Lloyd
Majestic Heights
TOODYAY
Mt. Nardie 405 m
Katrine
NORTHAM
Bobakine Range
Moondalup Range
Morangup Hill 477 m
Mt. Dmmanney
MECKERING
HIGHWAY
Meenaar Reserve
Clackline Reserve
Clackline
Bakers Hill
WUNDOWIE
WOOROLOO
To Perth
GREAT
Reserve
Mt. Mackie
Dyott Range
Mt. Bakewell 468 m
The Lakes
GREAT SOUTHERN HIGHWAY
St. Ronan's Reserve
YORK
Mt. Brown
Green Hills
To Quairading
MUNDARING
Helena River
Canning River
Talbot
Dale Bridge
Mt. Dale 548 m
BEVERLEY
0 10 20 30 40 50
KILOMETRES