LAND FOR WILDLIFE NEWS

Newsletter of the LAND FOR WILDLIFE scheme

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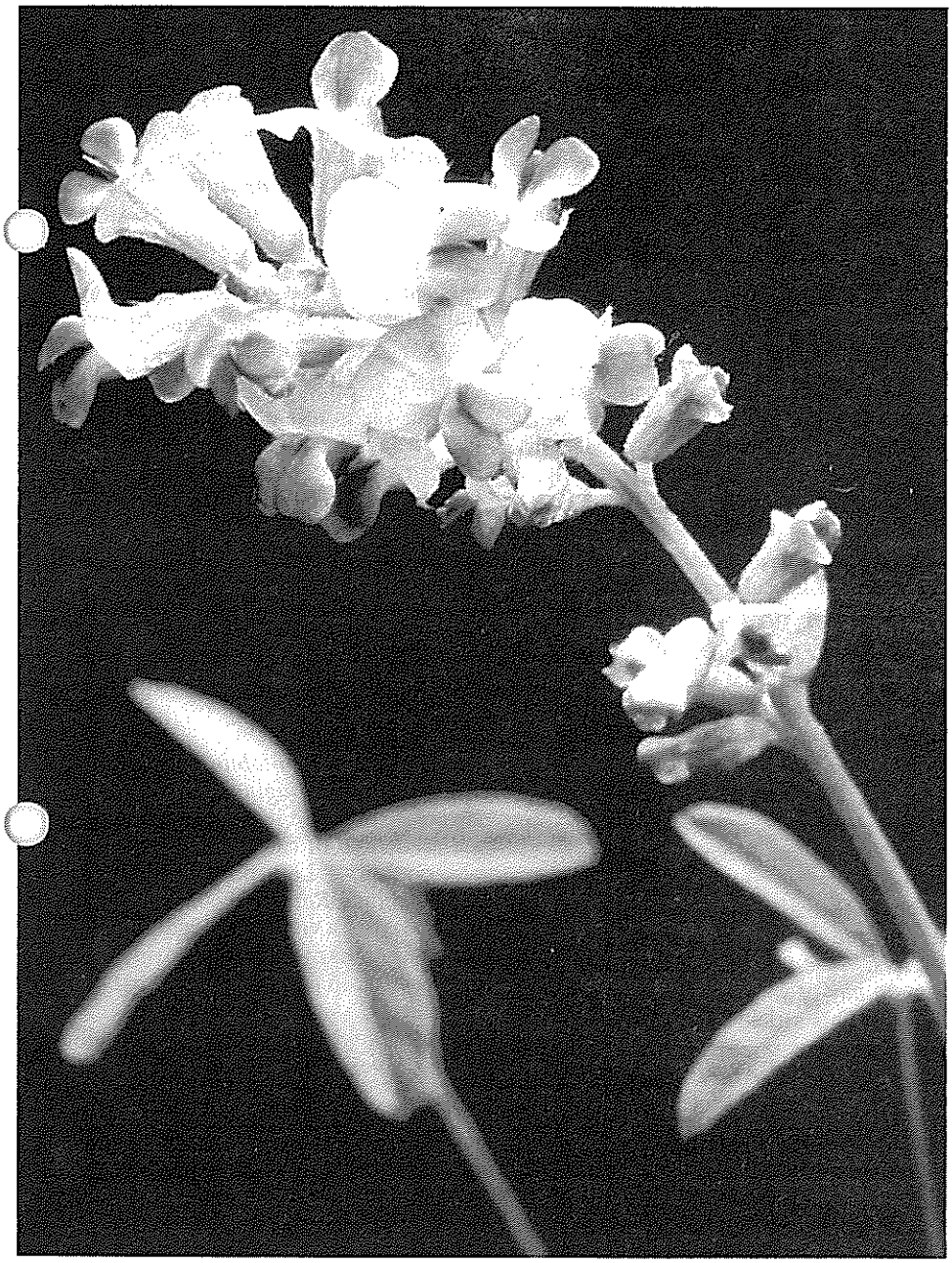

Inside

◁ **The rare pea, *Psoralea tenax*, a native grassland species. Photograph by Trevor Phillips, La Trobe University.**

Trees seem to have a magnetic attraction to humans. Perhaps it's just that they are one of the few living organisms that are bigger than we are that gives them a special presence. Trees are but one element of the natural world. In many parts of Victoria trees were naturally sparse. The little native daisies, the orchids, creatures in the litter of grass, twigs and branches - there's much more to a habitat than the overstorey of trees. Wildlife certainly sees it that way. A habitat consists of many resources. In this issue we look at some of the less obvious elements of natural Victoria.

Department of Conservation & Environment

Bird Observers Club of Australia

Editorial

I recently came upon some old newspapers in a delapidated farmhouse. They dated from 1928, depression times. One article drew attention to the ti-tree scrub around Port Phillip Bay and called for action to prevent its disappearance. A familiar cry. What is it that motivates change? Why, in spite of much goodwill and discussion, does the environment seem to still suffer to the detriment of our social and economic futures? Let's hope Land for Wildlife can play a part in real change through our actions.

Land for Wildlife is attracting increasing interstate and overseas interest. Barry Clugston (LFW Horsham) visited Tasmania, at their invitation, to discuss the scheme. We have had individuals from New Zealand and California request information on the scheme and signs.

If you are looking for a way of storing newsletters, why not get some A4 transparent pockets for your Notes folder - available at newsagencies and stationery suppliers.

A survey form accompanies this newsletter. We are constantly endeavouring to improve the scheme, to evaluate its successes and failures, to listen to members views and shape our directions for the future. The information we gathered from our previous request for information has been invaluable in identifying the needs of members at that time. This form is more detailed but I hope no trouble to complete. Also enclosed is a bumper sticker depicting the Land for Wildlife sign.

Current membership of the scheme is 1423 and growing fast. 400 landholders joined in 1991!

Stephen Platt

Across the editor's desk

Propagating native grasses

My interest in native grasses goes back some years but only during the last twelve months have I been trying to identify and grow them, a hobby which I find totally absorbing and challenging. Many hours are spent with my microscope and reference books trying to key out the beautiful inflorescences. Having no prior knowledge of botany I had many new words to learn!

I have a permit to collect small amounts of seed and cutting material locally and have mainly raised my own plants. My propagation method is simple, a mix of sand and peat 3:1, punnets stand in a thick base of coarse sand surrounded by several rows of bricks, covered with shade cloth and kept moist. This area receives sun all day. I am still learning about seed dormancy and storage times but have had reasonable success with autumn sowings of fresh seed - Wallaby grasses (*Danthonia setacea, D. geniculata, D. longifolia, D. caespitosa and D. laevis*); *Chionochloa pallida*, Hedgehog Grass *Echinopogon ovatus*, Windmill Grass *Chloris truncata* (I will have to watch this one as it can become a weed), *Poa sieberana, P. ensiformis*, and *P. poiformis* and *Stipa scabra, S. rudis*, and *S. elegantisima* (not local). *Stipa* germination has generally been slow but the bog method has yielded some seedlings. Division (of tussocks) seems preferable with Kangaroo Grass *Themeda triandra* as there is so little viable seed. Seedlings are then potted into tubes until large enough to plant out.....

Patricia Tratt, METUNG

Patricia has established two areas of native grasses interplanted with other species typical of local grasslands. Editor.

Raptor nest - correction

Vol. 1,No. 5 p3. Dr David Baker-Gabb (DCE) points out that telephone poles are unlikely to be used as nest sites by raptors but are used as perches and are being trialled as part of mouse control in crops.

Article on ducks

"I enclose a copy of our monthly magazine `The Bird Observer' containing an article `Up Tails All - the suzzlers of south-eastern Australia' by Anthea Fleming which may be of interest to your readers....We would be happy to post a copy to any of your readers who request same." This article examines the habits and habitat requirements of the ducks found in Victoria.

Ellen McCulloch, BOCA, P.O. Box 185, Nunawading, 3131.

Wildlife and farm dams

Land for Wildlife Note 15 refers to Cumbungi *Typha orientalis* as introduced; however this is a *native* species. Presumably some confusion has occurred between this species and *T. latifolia* which *is* introduced. The two species are similar in appearance and usually require microscopic examination of the flowerheads to separate them, but *T. latifolia* is most likely to be found in the vicinity of larger cities and in my experience is not very common.

T. orientalis and *T. domingensus* are both native Cumbungis, and while they can be very invasive they can also be managed as wildlife habitat by the use of control channels or staggered cuttings. As either species is likely to appear naturally in any dam or waterway in areas where they are abundant (particularly towards the Murray) landowners may find it more productive to manage and restrict Cumbungi growth rather than fighting it every centimetre of the way!

Another recommendation I would advise caution on is attempting to imitate the vegetation of local wetland areas. The majority of wetlands in the State are seriously affected by human activities over the last two centuries and quite a few are seriously degraded. The vegetation most commonly seen in wetlands is those tough and versatile survivors which have continued to thrive and spread despite (or in many cases, because of) European settlers draining, modifying and grazing wetland areas.

Species such as *Epilobium pallidiflorum* and *Philydrum lanuginosum* have become severely restricted in range apparently as a direct result of cattle grazing (personal observation). Less obvious disappearances include *Ranunculus trichophyllus*, in some cases a victim of unnaturally high concentrations of waterfowl during shooting seasons, in others gone without obvious cause.

Records of wetland species and distributions are very poor; indeed, we don't

Continued on page 12.

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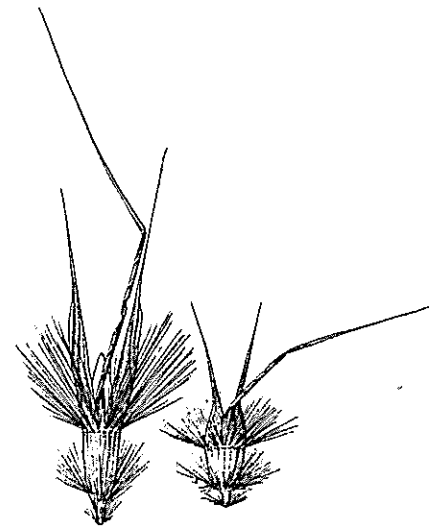
Practicalities

You can recognise some of Victoria's most common native grasses.

Kangaroo Grass

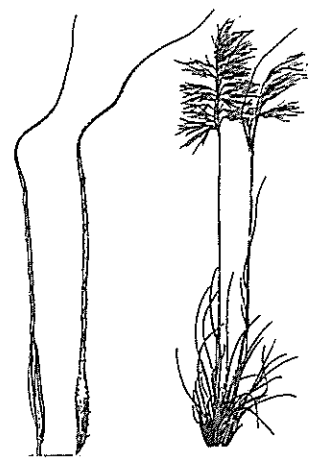
Kangaroo grass *Themeda triandra* is widespread in Victoria and is a dominant species in many of Victoria's grasslands but also occurs in many other vegetation types including forests. Rust-coloured in January, it is easy to recognise by the shape of its seed heads. Look for it along roadside verges that have escaped cultivation (e.g. rocky rises). A long-lived perrenial that is tolerant of acid soils. An elephant ride through the jungle in India may well pass through two metre high *Themeda*. The genus has a worldwide distribution. Only one *Themeda* species has been recorded for Victoria in recent times.

Wallaby Grasses



Wallaby grasses, *Danthonia* spp., have characteristic seeds (see sketch). The seed may be covered in hairs or have hairs confined to one or more rows. Some species are annual whilst others are perrenial. All 22 species in Victoria are native. *Danthonia spp.* is a common grass on the vast Serengeti Plains of Africa on which herds of wildebeast and other well known African wildlife species depend.

Spear Grasses



Spear grasses, *Stipa* spp., have sharply pointed seeds attached to a long shaft, hence the name. The mature inflorescences 'seed heads' often take on a feathery appearance. Some species have seeds that are covered in golden hairs. 34 native species, 4 introduced. Perrenials.

Tussock Grasses

Poa is a common native grass genus in Victoria often dominating the understorey in open forests. It is a feature of the high-altitude alpine grasslands. 25 native species, 5 introduced. N.B. Many other species form tussocks. Most Victorian species are perrenial. Introduced Kentucky Blue Grass is valued for lawns but has become a weed in native vegetation.

All sketches by Anita Barley, courtesy of the Royal Botanic Gardens. Anita's work will illustrate the forthcoming 'Flora of Victoria' to be produced by the RBG. Species information per Ross, J.H. (1990).

A common history

The fellowship between the plant family of grasses *Poaceae* and man has spanned thousands of years. Regarded as fundamental to the ascent of man from nomad to village-dweller, grasses are just as important today providing over half the world's food production (Lamp, 1990). Rice alone feeds half the world's population. Wheat, rice, maize, barley, oats, sorghum and rye are, in order of production, our main cereal crops. Half the world's sugar comes from a grass - Sugar Cane. Bamboos are in the grass family. The 'lemon fresh' of detergents doesn't come from lemons at all. It is derived from a grass *Cymbopogon citratus*. Many grasses have been so cultivated by humans that they are no longer viable in the wild (e.g. wheat) or are so altered that no recognisable wild parent stock can be found (e.g. corn). Vast areas of Victoria were once dominated by native grasses. Few remnants survive. We know very little about their economic, agricultural or medicinal potential. African studies have shown that deep-rooted perennial grasses can reverse the trend to soil acidification (Cremer, 1990). Kangaroo grass is a long-lived deep-rooted acid tolerant native grass. Both it and other native species may have future use in pasture management. The grasslands constituted a unique ecosystem in which wildlife grassland specialists developed. Grassland habitats are fascinating to discover and study.

Cremer, K. (1990), Trees for Rural Australia, Inkata Press. Lamp - see below.

How can I discover grasses?

Some references that can assist you to identify native grasses are provided below. Land for Wildlife News Vol 1, No. 2, p5 provides alternative suggestions for identifying species.

Wheeler, D.J. et al, (1982), *Grasses of New South Wales*, Univ. of New England, Armidale. This book, whilst not specific to Victoria, contains many Victorian species. Its main attribute is the simple system used to identify species in which diagrams accompany descriptions. Very helpful for amateurs.

Duigan, S.L., (1987), *The Grasses, Particularly those of Victoria, Australia*, Botany School, Univ. of Melbourne.

Lamp, C.A. et al, (1990), *The grasses of Temperate Australia - A Field Guide*, Inkata Press. Describes about one hundred common species. B&W sketches. Useful glossary. Excellent background on grasses, the basis for the above 'history'.

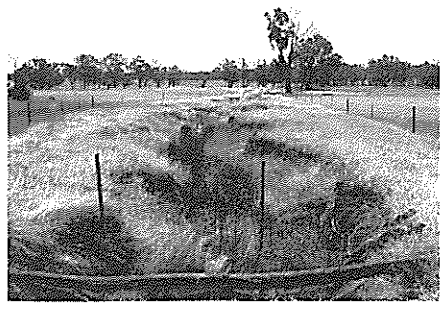
Ross, J.H., (1990), *A census of the vascular plants of Victoria*, Conservation, Forests and Lands, Vict. Useful for a list of species occurring in Victoria. Lists scientific names (native and introduced), families, name changes and where the species was described.

The above references include many other useful references about grasses in our region.

Practicalities

Stream erosion control

The first and most practical step in arresting many types of streamside erosion is to fence the area in order to allow soil-binding grasses and other ground covers to re-establish or recover. Ferns, rushes and other plants found on stream verges are also vitally important, as can be plant debris. Often these are forgotten in favour of larger plants. Frequently, the topsoil has washed away from the bank of a rapidly eroding stream and so it is difficult for plants to re-establish in this critical area. Further works to control erosion are often required before plants can establish. Do not underestimate the width required for fencing. Remember that whilst the stream is actively eroding, the banks are not in their stable condition. Sharp drops may eventually form gentle slopes when stabilised and require more width. To adequately buffer the stream using vegetation allow as much width as possible (20 metres is recommended but may not be practical in many situations). The Department of Conservation and Environment (DCE) can provide specific advice for your property. Contact your nearest DCE office.



Fencing promotes ground-covers which are important for erosion control along streams. Photo: Stephen Platt.

Re-establishing Kangaroo Grass

Kangaroo Grass can be re-established on a site by spreading *Themeda* hay across the area for establishment, immediately after harvest (seed shed is rapid), and then burning the hay at the earliest opportunity (McDougall, 1989). Prior preparation of the site using a knockdown herbicide may be beneficial. Alternatively, mouldboard ploughing or soil scalping could be trialled. Transplanting is an inefficient technique although it can be successful for small areas.

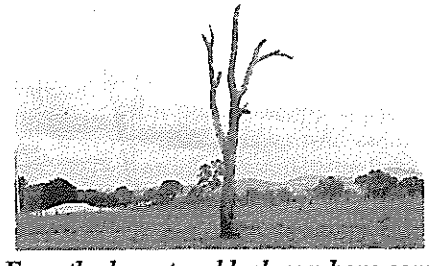
Reference: McDougall, K.L., (1989), *The Re-establishment of Themeda triandra (Kangaroo Grass): Implications for the restoration of Grassland*, ARIER Technical Report Series No. 89, Dep't Conservation, Forests and Lands, Victoria.
Stafford, J.L. (1991) *Techniques for the establishment of kangaroo grass in South Australian conservation reserves*. Plant Protection Quarterly, Vol. 6(3).

Plants from cuttings

Many native plants can be successfully propagated from cuttings. As a general rule-of-thumb, take cuttings following flowering when soils are still moist and warm. At this time the plant is likely to be translocating sap down into the roots in preparation for the dryness of summer and is often capable of producing root growth. Hormone root-stimulating powders are available but these are often unnecessary. Cuttings can be a useful method of propagating plants that are uncommon or that seed infrequently. They have the disadvantage of being genetically identical to the parent plant and so should not be considered for large-scale plantings. Nurseries often use a seedling mix, heated from below by a specialised 'electric blanket'. The heating encourages root development. A concrete slab heated by the sun or other arrangement might be used as an alternative.

Dead trees and stumps are important wildlife habitat.

With demand and prices for fuel increasing there is constant pressure on timber supplies. On many roadsides, as soon as a tree limb falls it is carved up for firewood. Even live branches are being cut by unscrupulous collectors. This is indicative of the undersupply of suitable timber on properties. Dead trees are very important wildlife habitat. In many cases this is because they are old and contain many hollows. Recent studies have shown that bats tend to roost in dead trees or dead branches on live trees. Dead wood may have particular properties that some wildlife species prefer such as better insulating qualities or may simply continue to be utilised as when the tree was alive. As a rough guide, dead trees will remain standing for about fifty years.



Even the barest paddock can have some wildlife values if dead trees and stumps are retained. Photo: S. Platt.

Landholders removing an old stump from a paddock are frequently disappointed to find a colony of bats or other native animal, that was sheltering within, is now without a home.

Woodlots on the farm

A managed farm woodlot will overcome the need to harvest dead and/or old trees, both of which are in short supply, are hardest to replace and constitute valuable wildlife habitat. A woodlot has significant advantages over using dead trees for fuel or construction.

Live wood is easier to cut with a chainsaw, is less damaging to chainsaw blades and will split naturally when it dries reducing the time and effort spent on axework. Small diametre logs are easier to handle and can be used for firewood or posts. However, a permit may be required. Talk to your local authority.

To manage a woodlot for timber and wildlife it is necessary to maintain natural processes as far as possible. Various age classes should be established and at least some trees allowed to mature fully (ie. not harvested). A full complement of understorey species will help to retain the health of the woodlot and provide for a range of wildlife species. Selective harvesting of trees with minimal disturbance to the woodlot will help to maintain its biological values. Timber can also be obtained from thinnings of areas that are regenerating naturally. Woodlots avoid the cost of carting firewood from other areas. The return from a woodlot, particularly if you value its aesthetic and wildlife values, may offset the cost of reduced pasture. A woodlot can also be used for stock shelter in severe weather or assist in erosion control. All round - a good investment that avoids the need to harvest old and dead trees which are better off left alone. Fallen dead timber is used by wildlife (e.g. reptiles, insects) and returns nutrients to the soil, thus completing the natural cycle of growth and decay. It is not wasted.

Natural drilling rigs

Many native grass seeds are equipped with a slender attachment called an awn. The awn is a magnificent piece of equipment. The awn of Kangaroo Grass consists of a spiral near to the seed, a straight length then a curved piece almost at right angles to the previous sections. When rain falls on the seed the curved section stands the seed upright and the greater humidity causes the spiralled section to unwind thus drilling the seed into the soil in preparation for germination. When collecting seed of grasses equipped with awns it is preferable to try to retain this marvellous structure. To see the awn in action all you need to do is to collect some Kangaroo Grass seed in January, place it on a seed tray and sprinkle with water from a hose. The tray will come alive with the upstanding and twirling movements of the seeds!

The Pollinators

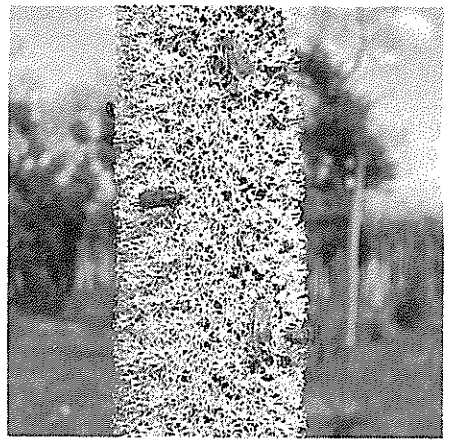
Sharing genetic material with other individuals of the same species confers considerable advantages on a species (Barash, 1977). In fact, it is such a powerful evolutionary force that most species, at least during one part of their life cycle, reproduce sexually. For plants, this presents a peculiar problem. When you're fixed to one spot, how can genetic material be transferred?

Primitive land plants experimented with dispersal of their genes, stored in a special package we call pollen, using wind and water. This method is very hit-and-miss. Not all days are windy and, because pollen and receptive flowers ripen over relatively short time periods, it may be that no pollen makes it to a flower on another plant. Huge quantities of pollen must be produced to increase the chance of successfully reaching another plant of the same species and this places a considerable energy burden on the plant, having to waste pollen 'fruitlessly'.

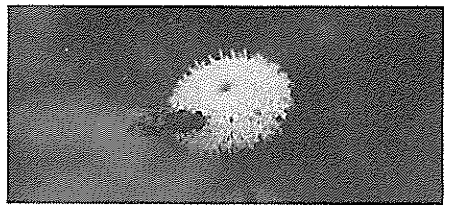
A much better way of transferring pollen is to get something to take it to the location you desire. Bees, moths, butterflies, beetles, wasps and other invertebrates, birds and mammals constantly move about and so are ideal pollen vectors. Plants have seized the opportunity to use them for pollen transfer and offer enticing rewards for this service. Competition for pollinators has led to lavish floral structures and displays. Copious quantities of nectar or pollen may be produced as an enticement to pollinators. At times this may exceed the ability of pollinators to remove it, so that nectar may rain from the canopy or flow down the stem.

By far the most successful structure for attracting pollinators is the flower. Each flower is uniquely designed to attract one or more pollinators and effectively transfer pollen to another flower. Many flowers have slender filaments called stamens that carry masses of pollen on their tips. Once brushed by a pollinator, the pollen is carried from the flower, amongst fur, feathers, hair or scales, to another of its kind that must also be designed to pick up the pollen but avoid pollinating itself. Hence the receptive female part of the flower, the style, usually protrudes out further than the stamens and has a sticky apex. The surface of pollen grains is minutely inscribed with various patterns that allow it to hang on to its host. Many plants do not produce viable seed when pollinated by their own pollen and require outcrossing (transfer of pollen to another plant of the same species) for successful seed production. Orchids package their pollen in closed sacks buried within the flower structure and rely on the visitation of specific pollinators to carry their precious bundles away (see Vol 1, No. 4, p11).

Native arthropods* are employed extensively by plants as pollinators, especially by the ground flora. Flies, beetles, moths, butterflies and native bees (many species are solitary) are examples of insect pollinators. Plants that use insects as pollinators typically have small flowers that produce small quantities of nectar. "Bluish blossoms and a pattern of spots up the throat of a blossom are universal signs that insects are the pollinators" (Pizzey, 1988).

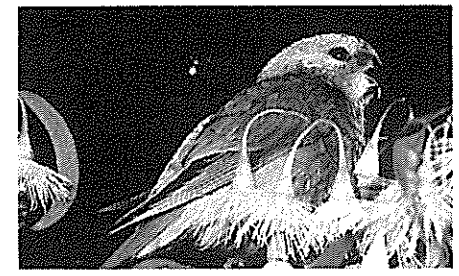


Moths are attracted to flowers on this Grass Tree *Xanthorrhoea* which produced its inflorescence following the Ash Wednesday bushfires. Photo: S. Platt.



A fly visits this button daisy *Leptorhynchos*. Photo: S.Platt.

Birds are also widely used as pollinators. They offer an effective carrier (feathers), high mobility, patterns of behaviour, (including aggressive defence of particular species), and patterns of movement that favour efficient pollen transfer. Further, they are active in winter when invertebrates are not (Pizzey, 1988). Bird-attracting flowers are usually brightly coloured and usually offer substantial rewards. Various flower designs, such as long tubular forms, ensure contact is made with the desired pollinator. Some birds probably see yellow and red more brightly than we do because of microscopic yellow and red droplets of oil scattered across their retinas (Morecombe in Pizzey, 1988). So bird-attracting flowers are often red or yellow. Nectar is a poor source of protein and so birds using nectar as a food supply must also seek insects to make up their diet. Hence, honeyeaters will spend considerable amounts of energy flying after relatively small insects.



Lorikeets, such as this Purple-crowned Lorikeet, seek nectar from eucalypts. Photo: Ian McCann.

Mammals, such as the Eastern Pygmy Possum and Sugar Glider, are also attracted by nectar. Bush Rats and Antechinus may seek nectar where it is plentiful, and may pollinate shrubs such as Banksia.

Pollen can hitch a ride in a Sugar Glider's fur. Photo: Ian McCann.

It is obvious that without pollinators many of our plants would be destitute, unable to successfully breed and produce enough seed in order to ensure their continued survival. There are other factors which reduce these opportunities even further (see page 9). Insects, birds and mammals play an important role in rural Victoria, not just as predators of agricultural pests but in ensuring the health of vegetation, be it used for shade and shelter, wood production or the enjoyment of observing nature. They can be encouraged by using local native species of plants, a diverse flora including shrubs and ground covers typical of the local environment and by connecting habitat areas (see Note No. 3). Factors that promote a healthy invertebrate population, such as leaf litter and rotting wood, are important in relation to pollination.

* Arthropods, or invertebrate animals in the phylum Arthropoda, is a term used to describe a group of animals most people would refer to as 'insects'but includes a range of other species that are not true insects e.g. spiders.

References:Barash, D.P. (1977), **Sociobiology and Behaviour**, Elsevier, pp 138-40.
Pizzey, G. (1988), **A Garden of Birds, Australian Birds in Australian Gardens**, Viking O'Neill.

Stephen Platt

Battling the odds - wildlife habitat on an irrigation property.

When Alan and Mary Burgess invited several Government agencies to create wildlife habitat on their treeless irrigated block it was a challenge for all involved. To their credit, they remain avidly enthusiastic about the project to this day.

There has been an amazing transformation on an irrigation dairying property near Shepparton in a mere 13 years, from a flat, bare series of paddocks to a great wildlife haven. Now there are trees surrounding the farmhouse and sheds. Trees run along many of the fence-lines and the farm gives the appearance of being well managed and well loved.

In the mid-to-late 1970's a joint departmental operation started a 'Wildlife on Farms' demonstration project, which was the forerunner to the present *Land for Wildlife* scheme. Fisheries and Wildlife, Forests Commission, Department of Agriculture and Soil Conservation Authority joined forces to make a model wildlife farm in co-operation with Alan and Mary Burgess at West Tallygaroopna. Alan and Mary are dairy farmers in the irrigation country north of Shepparton and were keen to enhance their farm with trees and to attract more wildlife.

The Burgess' had bought the unimproved 35 hectare farm in 1964 with a poor water management program, four buloke trees and a handful of sugargums. Even the sugar gums have since been removed for SEC safety requirements.

Planning for the project involved looking at the existing fences, tracks, structures and stock management and reviewing the whole farm layout - not unlike the whole farm planning principle of the 90's! Double fences were built to establish tree corridors on the north and west sides of the farm.

Some of the early plantings were not a success because frosts and then too much water took a toll. A water-recycling dam was built with an island in the centre. The island has a series of flat shelves and when the water recedes it gives waterbirds more feeding and dabbling areas in the shallows.

There is another dam with a floating island which still survives after 13 years. This was constructed using cleaned heavy -duty plastic drums secured to a PVC pipe base. Grasses were planted onto a straw mat and the whole structure anchored to the dam floor by a rope. Now the island blossoms with grass and small shrubs and it even includes a nest box for ducks. Sedges and reeds were introduced to the dam from a nearby water channel.

Many of the Burgess' original plantings failed due to inappropriate choice of species and waterlogging. In order to keep the young trees out of the waterlogged soil, mounds of earth were constructed along fencelines and seedlings established in these with great success. Alan is convinced that it is important to start small and plant in spring on dry areas. This contrasts with non-irrigation areas where autumn is usually the best time to plant. 'The trees themselves are not of much value but the protected areas they create in the paddocks are very useful', he says. 'The bird count 13 years ago was just 24 species, now Ian Temby (DCE) has recorded 110 species on the farm', Alan says.

'Neighbours have been observing our failures, but they are busy planting trees as well. Our kids seem to care more about the environment, but some of that could have been developed through the schools', Alan said.

Mary Burgess: 'It's a much nicer and more peaceful place to live now with shade and flowering trees. We have tried to create corridors and they attract some wonderful birds to the area'. Obviously there have been some remarkable successes with this demonstration farm despite the problems of establishing vegetation in irrigated country. The property stands as a testimony to the foresight of those early planners involved and a credit to the farmers who so clearly saw the benefits that lay ahead.

The farm is still used by Victorian College of Agriculture and Horticulture students and other people as a demonstration model.

Barry Clugston, LFWEO, Horsham.

Left to right: Geoff Miller, DCE; Amy Burgess; Mary Burgess; Jim McGuire, DCE; Alan Burgess and Lori Burgess. Photo: Barry Clugston.

Artificial floating islands can attract a range of waterbirds. They offer a means of providing a relatively secure roosting or breeding site on an established dam. Photo: Barry Clugston.

How important is location to plants? - a grassland example

Cast your eye over a remnant native grassland west of Melbourne and it is easy to be deceived into believing that this is a simple ecosystem. Near Melbourne, grasslands are usually dominated by the ubiquitous Kangaroo Grass *Themeda triandra* which creates an impression of crop-like uniformity. Closer inspection of these grasslands reveals a magnificent diversity of plants. The grass and daisy families are the most numerous and diverse. Along side them are many lilies, orchids and peas. What factors control where plants grow and how can so many different plants grow together? Why doesn't one plant, the most competitive, overcome all the others? How does placement affect management and revegetation projects? In this article we look at some of the influences using grasslands as an example.

Twenty kilometres south-west of Melbourne, within sight of the city skyscrapers, lies one of Victoria's most unique reserves. The Laverton North Native Grassland Reserve looks to be one hundred acres of brown grass but on closer inspection reveals the world of grasslands- an environment that confronted the first of Victoria's european settlers. Photo: Max Bartley.

Native grasslands typically occur on fertile soils that are subject to a dry season. Fire plays an important part in their ecology. To the west of Melbourne, the Keilor Plains lie in the rainshadow of the Brisbane Ranges and You Yangs on fertile soils derived from basalt, the entire region at one time having been subject to lava flows. Whilst this area was predominantly an open grassland, there were some trees and shrubs. Red Gums *Eucalyptus camaldulensis* occurred along watercourses and beside swamps. Lightwood *Acacia implexa*, Drooping She-oak *Allocasuarina stricta* and Tree Violet *Hymenanthera dentata* were scattered across the plain, some original specimens being still visible. We know this information in part from historical sources such as the maps of Wedge Darke who surveyed blocks for subdivision in this area during the 1840's. He used these larger plants as corner markers on his maps.

A one hundred acre reserve at Laverton, adjacent to the Geelong road and within sight of the city skyscrapers, contains a remnant of the native grassland. For the plants that grow here it is a harsh place in which to survive. There is no shelter or shade from larger plants. The soils dry out in summer, creating inch-wide crevasses in places, and swell in winter to form gluggy clays. Fires may rage across the grassland at frequent intervals. Plants require unique characteristics to cope with these extremes and have adopted many different strategies.

Some species, notably the orchids and lilies, grow and reproduce in late winter and spring. They take advantage of the good season to accumulate a food reserve which is stored in a carrot-like taproot. These roots were valuable food sources to aborigines and wildlife, such as corellas (see Vol 1, No. 1, native yam). The taproot is a time-capsule, storing sufficient food to allow rapid growth and being sufficiently strong not to be torn apart when the soil cracks. Other species have an annual life history. These species survive the harsh summer as seeds. They have been largely replaced by introduced weeds in the grassland today. Another strategy is that of the perrenial plants such as Kangaroo Grass. It is very long-lived, perhaps more than fifty years. Amongst its adaptations to this environment are coarse fibrous roots that can withstand the shearing forces created as the basalt soils tear apart in summer. It's roots can penetrate deep into the soil tapping into water reserves that lie in the cracks of the bedrock one or two metres below the surface.

Each species has the advantages of its life history strategy but also the disadvantages.

The soil is particularly important in determining where plants grow in this ecosystem. It is only when you see beneath the surface that it is obvious that this is not a uniform environment. One can suppose that, as the lava flows solidified, rises and depressions were created. Water would have been most plentiful in the depressions and lifeforms different here from on the rises. Soils would have developed more rapidly in the lower areas due to greater biological activity. Today we can see the results of these changes. In low lying areas the soils are deep, there being at least two metres to the bedrock, and black overlying pure white kaolin clays. Small basalt rocks, 'floaters', occur on the surface or have migrated down to the kaolin boundary during soil cracking. In contrast, the soils of the rises are shallow, often with emergent bedrock protruding. They are uniform red and more acidic than their low-lying counterparts. The clay fraction is less and cracking less pronounced. Various other soils can be recognised. There is a light grey clay around the edge of some large depressions that sticks like wet pastry. Intermediate red soils support an open herbfield association of plants. Larger depressions may be inundated for part of the year and support aquatic plants. Such dramatic variations in soil and water availability determine where plants can survive in the grassland. It is far from a uniform environment.

Craspedia chrysantha growing in a seasonally-inundated depression on black soils at the Laverton North Grassland Reserve. Planted in 1982. Photo: S. Platt

Although some plants are widespread, the majority occur in distinct associations on particular soils. The Laverton North reserve has been substantially degraded from its native condition. In order to restore some of the plant communities, La Trobe University has undertaken a program of re-introductions and research into the flora of the reserve. In the early 1980's searches were conducted of all local remnant grasslands within five kilometres of the reserve in order to find local seed sources for propagation of seedlings. These were then grown in a glasshouse and transplanted into the reserve during autumn. Careful note was made of the soil characteristics and associated plants during collection of the seed. This was then matched in the field when transplanting seedlings. *Podolepis jaceoides* went into black soil depressions with *Craspedia chrysantha* and *Calocephalus citreus*; *Caesium virgata* to shallow red soils on the rises near rock outcrops. The plants introduced to the reserve in this way, by matching to their ecological 'compartment', have been successfully established. Only time will tell whether they are able to reproduce and hold on in this altered system.

Typical black surface soil profile. Kangaroo Grass roots tap water in bedrock cracks many feet below the surface. Photo: S. Platt.

Basalt bedrock occurs at shallow depths beneath rises where soils are red in contrast to the depressions. Photo: Carol Green

Weeds are a major problem in the reserve. Following extensive controlled burning it was possible to identify those areas of the reserve that were in the most natural condition. These were selected for augmentation with species lost from the original flora in order to avoid problems associated with weed competition which can be extremely severe in some areas. Seedlings were transplanted with minimum disturbance to the existing soils and vegetation so as not to favour the introduction of weeds.

Natural regeneration is rarely observed in the grassland. It may be that existing perennial plants monopolise resources so effectively that it requires the death of a plant to allow recruitment of others or that changes to the soil surface, such as the loss of moss and lichen mats, are involved. No one knows. Reports of wagon wheels churning up yam roots (see LFW News Vol 1, No. 1, p 6) seem at odds with the compact soils observed today.

There are some important principles involved here for people restoring or re-creating vegetation communities.

Plants do not occur randomly throughout the landscape. Soils, aspect, water availability and other environmental factors determine where species grow. This must be taken into account if planting or direct seeding is to be successful.

Weed control is a major problem for the establishment of plants. In this case, it was overcome to a degree by introducing plants into areas that had suffered less disturbance and were thus less weedy. It is worth noting that the climatic variables that limit native species distributions may also prevent the spread of weeds beyond the soils and other environmental conditions to which they are adapted.

Fire is also crucial in grassland ecology and all native species have adaptations to survive frequent fires. For example, *Psoralea*, pictured on the cover, produces seeds with a thick seed coat and can quickly re-sprout from underground buds. Seed germination is promoted when fire cracks the seed coat allowing entry of water (c.f. wattles Vol. 1, No. 2 p 4).

When planning your next revegetation project, consider the location of the plants you want to establish if you wish to improve your chances of success.

Stephen Platt

Further reading/viewing:

Lunt, I.D., (1991), *Management of remnant lowland grasslands and grassy woodlands for nature conservation: a review*, Victorian Nat. Vol 108, No. 3. This paper contains a comprehensive reference list.

Conley, D. & Dennis, C. (1983), *The Western Plains - A Natural and Social History*, Aust. Institute Agricultural. Science.

A list of plant species distribution typical of the Keilor Plains at Laverton is available from the editor. Video - *'Preserving Native Grasslands'* available - DCE, Sales and Information Centre, 240 Victoria Parade, East Melbourne, 3002. Ph 03 412 4795.

Flora of Melbourne

A Guide to the Indigenous Plants of the Greater Melbourne area (1991), Society for Growing Australian Plants-Maroondah, Inc. (covers from Werribee, Toolern Vale, Sunbury, Mernda, Coldstream, Monbulk, Langwarrin). Introductory chapters cover plant communities, soils, regeneration of a house block, creating or restoring wetlands, planning and design of bushland restoration, environmental weeds, seed collection, storage and propagation. This is followed by a short description and B&W sketch of each species. Species are arranged in alphabetical order. Keys are not provided.

When the Engebretson family purchased their property at Heathcote Junction there was no obvious ground flora due to grazing by steers and a horse. Stock were removed and native grass tussocks have regenerated, adding texture and terrific wildlife habitat. Trees and shrubs are also regenerating. What a great spot for a picnic and right at the back door! Photo: Engebretson family.

Ants - seed dispersers extraordinaire.

Ants are numerous and diverse animals in Australian vegetation. One hundred species may occur within a few hectares (Greenslade, 1986). The inconspicuous nature of these tiny creatures belies their capacity to shape their environment.

Ants play a vitally important role in the ecology of natural vegetation. In this newsletter we have already discussed their interactions with butterflies and mistletoe (Vol 1, No. 2, p12) and honeydew, produced by psyllids (Vol 1, No. 5, p6). One of the most ecologically significant roles of ants is in seed destruction and dispersal.

Ants feed on many substances, including arthropods (insects, etc.) carrion, plant exudates, honeydew and seeds (Greenslade, 1986). Berg (1975) found that about 1500 species of Australian plants bear ant-attracting structures, called elaiosomes, on their fruits or seeds. The elaiosome is rich in oils and is consumed by ants. Many ant species also consume the seed. So why is it that plant seeds seek to attract ants when they have a chance of being eaten?

Hughes (1990) investigated seed dispersal by ants, termed myrmecochory, in sclerophyll vegetation. 'Sclerophyll' refers to the 'hard-leaved' nature of the plants that occur in these forests which are widespread in Victoria on the foothills. Up to 50% of shrub species seeds in the study area had ant-attracting structures. Hughes investigated the fate of seeds dispersed by ants and came up with some interesting results.

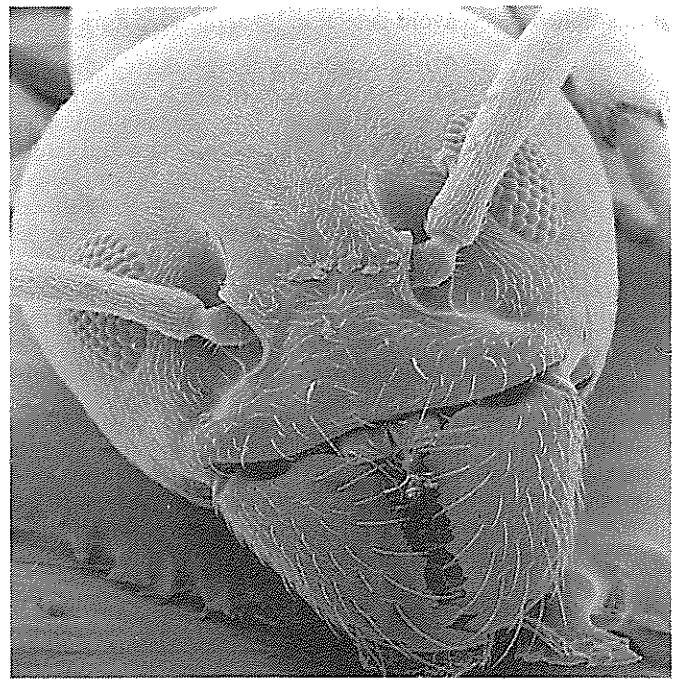
All fallen seeds had a high probability of being removed by ants within a few days. Time of year influenced how quickly seeds were removed, the rate being greatest in summer. Most seeds were taken directly to ant nests. Whilst the majority of seeds were carried less than two metres, distances up to eleven metres were recorded.

Once a seed reaches an ant nest it may have several fates. Some species of ant eat the seed and elaiosome, although seeds with a thick seed coat (e.g. *Hardenbergia violacea*) may be too tough to be cracked open. These 'harvester' ants tend to carry seeds shorter distances. Some seeds may escape them by being lost within the ant nest. A second group of ants, which have a more varied diet, consume the elaiosome but discard the seed intact either outside the nest or within it. Hughes found that seeds discarded within the nest were buried up to twelve centimetres deep but most were in the top six centimetres. To test how well seeds survived, Hughes fed a known amount of seed into ant nests, then, some time later, burnt the site and monitored germination. Only about 1% of seeds fed into nests emerged after the fire.

So why do seeds have an ant-attracting structure when some species of ant eat seeds? Hughes proposes that the presence of an elaiosome increases the chance that the seed will be removed by a species of ant that is attracted to the elaiosome and not the seed. This has led to many species of Australian plants offering a substantial reward to the omnivorous ants in return for a degree of safety from the harvester ants.

What relevance does myrmecochory have to the management of vegetation? Well, firstly, it is important to remember that there is a highly inter-related web of interactions between plants, animals and their environment. It is not a simple system and should not be treated as such. It affects planting since to reinstate these interactions requires a wide range of species typical of the site. It affects natural regeneration since a predominance of harvester ants may significantly reduce seed survival. It affects direct seeding. Bitumen emulsions have been tried as a means of promoting seed germination whilst retarding myrmecochory. Ants are an important component of our fauna. Don't overlook them.

Stephen Platt



Scanning Electron Micrograph of an ant head. Seeds seek ants in order to avoid them (i.e. seeds use ant-attracting structuresto lureants that do not consume seeds and so improve their chances of not being eaten by harvester ants). Ant predation on seeds can reduce the ability of vegetation to reproduce. Photo:Shirley Green

References:

Berg, R.Y., (1975), *Myrmecochorous Plants in Australia and their Dispersal by Ants*, Aust. J. Bot., 23, 475-508.

Greenslade, P. J. M., (1986), *Ants*, in Wallace, H.R. (ed), The Ecology of the Forests and Woodlands of South Australia, Waite Agricultural Inst. & University of Adelaide, pp 154-69.

Hughes, L.,, (1990), *Seed dispersal by ants in sclerophyll vegetation*, PhD Thesis, Macquarie University, in Aust. J. Ecol. Vol 17, No. 1, March 1992, pp112-14.

Peninsula Plants

A Field Guide to Indigenous Plants of the Mornington Peninsula suitable for cultivation by Kathie and Peter Strickland. This handbook attractively and clearly describes 100 indigenous plants - found on and around the Mornington Peninsula. The species have been chosen because of their suitability for cultivation in the hope that more gardeners and farmers will be encouraged to grow them. On the Mornington Peninsula the native vegetation cover is down to a frighteningly low 6% compared with the Victorian average of 35%.

The descriptions follow a uniform pattern, placing each plant in its historical and geographical setting, describing its appearance and identifying features, the places where it is most likely to be found and its requirements in cultivation, based on the authors' practical experience in their Kareelah Bush Nursery (a *Land for Wildlife* property). Each plant merits a clear drawing by Peter Strickland with details of flowers, seedpods, etc. There is an index of common names and an index of scientific names.

Available: Greens Bookshop, Melbourne; Robinsons, Frankston; Farrells, Mornington R.R.P. $14.95 or direct from the authors at P.O. Box 31, Balnarring 3926 for $12 plus $4 P&P.

The good news - Plains-wanderer in Victoria

Recent surveys in the north of the State have turned up a surprising number of Plains-wanderer, a cryptic quail-like bird that has virtually disappeared from Victoria, like its natural habitat, the grasslands.

The destruction of lowland native grasslands is not unique to temperate south-eastern Australia. The pampas of Argentina, the prairies of America and the chalk grasslands of Europe have all been drastically altered and depleted due to their suitability for, and sensitivity to, agriculture. Threatened grassland fauna, such as the Plains-wanderer(*Pedionomus torquatus*), have undergone a concomitant decline.

The Plains-wanderer is a small, cryptic ground-dwelling bird that superficially resembles button-quail (*Turnix* spp.), with the female being larger and more brightly coloured than the male. The male does most of the incubation and all of the chick rearing, leaving the female free to pair with another male. This reversal of the sizes and roles of the sexes during breeding is unusual among birds.

Plains-wanderers were formerly widespread in the lowland grasslands of south-eastern Australia. They have declined markedly in range and numbers, particularly in coastal areas. They now have a very patchy distribution in their remaining strongholds in the Riverina of New South Wales, north-central Victoria and south-western Queensland.

Areas preferred by Plains-wanderers are sparse grasslands with about 50 per cent bare ground, ten per cent fallen litter, and the rest comprising of low (less than five centimetres) vegetation with a small amount of taller vegetation which is important for concealment. Plains-wanderers are about 15 centimetres tall when on 'tip-toes'. It follows that in sparse, but not dense, grass they can see over the vegetation, move freely when foraging and running away from predators in a hunched posture, while also being able to avoid detection by aerial predators.

Plains-wanderers forage during the day for a wide variety of seeds and ground-dwelling insects. Grass and saltbush seeds, and beetles, ants, sucking bugs and caterpillars, are most frequently taken. Their nests consist of a shallow grass-lined scrape. In the southern part of their range they lay first clutches between late August and early November, and second clutches in January if summer rains fall. Plains-wanderers have the ability to recover quickly from low population levels following droughts.

The main threats to Plains-wanderers are cultivation of native grasslands and overgrazing which result in permanent or temporary loss of habitat respectively. Any areas to be managed for Plains-wanderers need to be fenced to exclude rabbits and to control domestic stock.

Most areas favoured by Plains-wanderers are about 200 hectares, and on eroded country with the lowest productivity for grazing. The intermittent removal from grazing of less than one per cent of the poorest land on a large property should have negligible financial impact for graziers. In southern areas stock should be excluded in early August at the start of the Plains-wanderer breeding season. The reintroduction of stock will depend on rainfall and may be permitted as early as February in a wet year, as late as May in a dry year, or not at all during a recognised drought. While reserves containing more than 450 hectares of suitable grassland are ideal, even appropriately managed areas of 50 to 100 hectares can serve as drought refuges when overgrazing occurs, and subsequently act as nuclei for recolonisation of surrounding districts by Plains-wanderers.

Suggested reading

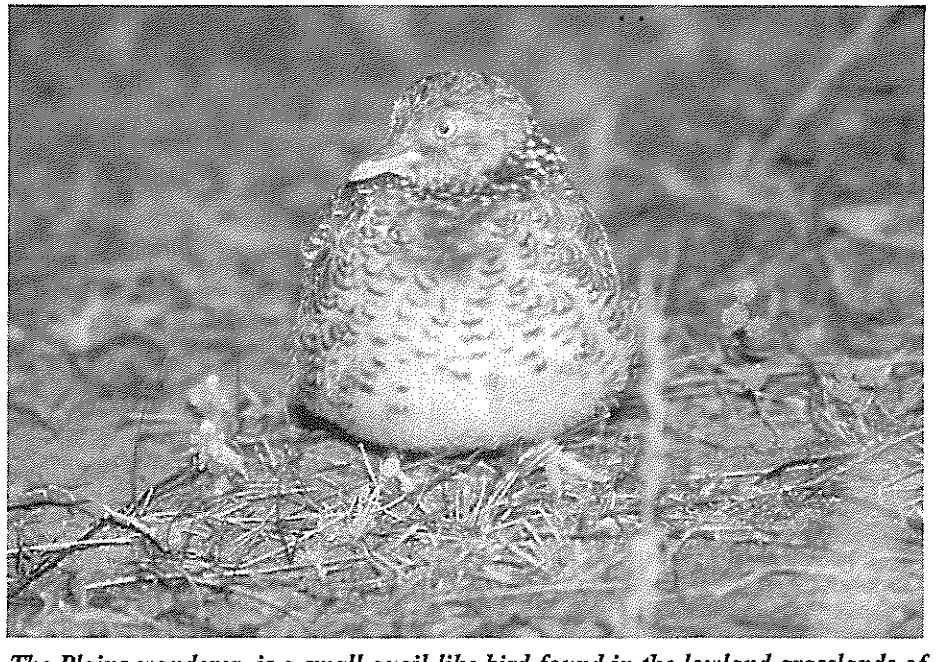
Baker-Gabb, D.J., Benshemesh, J. & Maher, P.N. 1990. **A revision of the distribution, status and management of the Plains-wanderer *Pedionomus torquatus*.** *The Emu* 90: 161-168.

Bennett, S. 1983. **A review of the distribution, status and biology of the Plains-wanderer *Pedionomus torquatus*,** Gould. *The Emu* 83: 1-11.

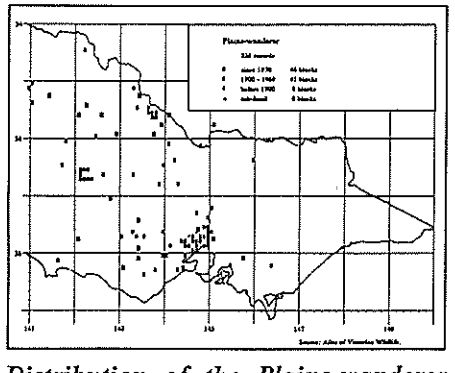
Dr David Baker-Gabb, DCE.

Readers might also wish to refer to the article on the Striped Legless Lizard (Vol1, No. 2, p 8) which is another rare species typical of Victorian grasslands.

Should you discover or know the whereabouts of a Plains-wanderer, we would be pleased to learn of the location, date observed and habitat. Editor.



The Plains-wanderer is a small quail-like bird found in the lowland grasslands of Victoria. Though rare, recent surveys on the Northern Plains have detected small populations still existing in the Swan Hill area. Photo: Tom Wheller.



Distribution of the Plains-wanderer Pedionomus torquatus in Victoria. Source: Atlas of Victorian Wildlife, DCE.

Bats - dispelling some of the myths and misconceptions

In Australia bats do not carry rabies nor any other serious disease. They are very clean animals and groom themselves regularly.

Bats do not get tangled in your hair. Their sophisticated sonar system enables them to detect something as fine as a human hair, so they are not likely to get tangled in a whole head full of hair!

Bats aren't blind. Flying Foxes have excellent vision and even the smaller insectivorous bats that use sonar can still see reasonably well.

Bats fulfil the ecological role that birds occupy during the day. They take advantage of the abundant supply of insects found at night when most birds are inactive. Fruit bats have better eyesight than insectivorous bats and are fruit eaters.

Bats are able to reduce their body temperature to within a few degrees of surrounding air temperature during winter when they go into a state of shallow hibernation called torpor. (Human body temp. = 37°C)

The body functioning of bats in torpor slows down dramatically. In an experiment to measure how often Little Mastiff-bats breathe whilst in torpor, a researcher was staggered to find the interval was 80 minutes!

A bat's active resting heart rate may be 400 beats per minute. When in torpor the rate can drop to a low 40 beats and when actively foraging may reach an astounding 1000 beats per minute. Within 10 secs the heart can drop back to the resting rate (typical human resting rate = 70 and active = 120).

In Victoria, most female bats mate during autumn but do not conceive until spring when an abundant supply of insects becomes available. They can store the male's sperm over winter and so have a head start which allows them to raise their young and obtain enough food for themselves and the young to build up fat reserves, necessary to last the next winter. Few bats are active during winter and the majority of these are males looking for females with which they may mate, even while the female is in torpor.

Bats do drink. They drink 'on the wing' in a similar fashion to swallows. Bats are also able to swim quite well - a kind of butterfly stroke. Some can relaunch themselves from the water but most have to swim ashore first.

Common Bent-wing Bats have been recorded living in the wild to 20 years of age. This is a remarkable lifespan for such a small mammal. The same species has been recorded returning from its maternity cave to over-wintering grounds in one night, a flight of 200 kilometres! The female of this species travels to a maternity cave, in East Gippsland, only about one week before giving birth and so must carry a nearly full-term baby weighing about one third of her weight.

Juvenile bats are assisted by their mother in learning about their environment. When learning to fly she may rescue them from aborted flights, swooping down to collect them and return them to a higher launch site. The young bat may weigh almost as much as its mother at this stage.

Male bats have a distinctive penis. This allows for easy identification of the sexes and is the only way to distinguish between some closely related species.

From a talk by Lindy Lumsden, DCE.

"The great vampyre-bat is, I believe, met with in the Straits; but I never saw one, although I have heard of its being killed near Melbourne." This quote is taken from a fascinating book written by an English immigrant to Victoria, Horace Wheelright 1853-57, who spent several years living in the bush around Melbourne making a living as a professional shooter. His natural history observations are recorded in 'Bush Wanderings of a Naturalist', republished in 1979 by Oxford University Press. To set the record straight, there are no vampire bats in Victoria. All the small bats eat insects whilst the larger species are fruit eaters (see LFW Note No. 12). Wheelright was probably referring to one of Victoria's fruit bat species.

Identifying bird calls

The Bird Observers Club of Australia publishes a series of tapes of bird songs called 'Field Guide to Australian Birdsong'. The sixth tape in the series has just been produced. The tapes are available for $13.50, including postage and packing, from the BOCA, P.O. Box 185, Nunawading, 3131. Telephone (03) 877 5342. A great skill that will open your eyes, and ears, to the life of birds.

Bush detective

You can tell the difference between the tiny black droppings of mice and those of bats quite simply. When dry samples are rolled between the fingertips, bat droppings disintegrate into a fine powder of insect remains, whereas mice droppings remain intact due to a sticky cement which binds them together.

Lindy Lumsden, DCE.

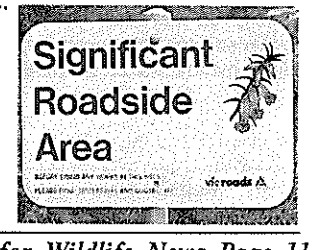
Seed bells - symbol of a wider concern

Commercial seed bells are widely available but are they a good idea? Who really benefits from a seed bell? The Bird Observers Club of Australia is concerned about the effects that seed bells may have on birds. What are the level of pesticides in seed bell grain? As lower quality grain is probably used for bells it is quite possible that the levels are high. What effect does indiscriminate artificial feeding have on natural bird populations? It has the potential to disrupt the dietary balance of natural populations, attract predators, disrupt social behaviour through increased interactions between individuals and species, and spread disease. In addition, an aggregation of native birds (e.g. White-winged Choughs) accustomed to free-feeding at a fixed point can substantially reduce other natural populations (e.g. skinks, insects, orchids) in the general vicinity of the food source (see Vol. 1, No. 4, p11) and is not to the long-term advantage of the birds. What holds a bird bell together? PVA wood glue is used in at least some bells. Have these glues been tested for their effects on wildlife? Are viable weed seeds present in seed bells that might be spread by birds?

The wider concern is that there are many changes brought about by people which are having an impact upon the natural environment. If we are alert to the potential concerns we can each be vigilant and ensure that changes, when needed, are well considered and have minimum deleterious impact on wildlife. Seed bells are obviously of more benefit to the human observer than the environment. A responsible approach would be to refrain from free-feeding birds or other animals or, alternatively, to only make food available when you intend to directly observe the bird. It is more of a challenge and more rewarding to observe animals in their natural state, wherever possible.

Roadside marking of special environmental areas

The Roadsides Conservation Committee has created a new sign that will identify significant roadside areas. Signs can be purchased by local councils. Full details and a brochure are available from the RCC, 240 Victoria Parade, East Melbourne, 3002.



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really know how many wetlands there were once! So don't just try to imitate what's around - relatively untouched wetlands are very diverse and surprisingly different from each other.

Finally, I'd like to point out that many wetland plants aren't locally adapted at all. Their primary adaptation is to spreading from one wetland to another. Many may be fugitive species, relying on being able to spring up anew in a different area when the conditions they require have changed beyond their tolerance. The rarest fugitive species at the present time may once have been quite common and widespread.

A significant number of wetland plants rely on wind or waterfowl for distribution of their seed. Seedlings may appear hundreds of kilometres from their parent plant, and they appear in apparently identical form across most of Australia and far beyond. These are surely the opposite of locally adapted and include *Ottelia ovalifolia*, *Baumea articulata*, *Typha spp.*, *Brasenia*, *Eleocharis sphacelata* and several smaller species.

Others may not extend as far as Asia but have an immense range including *Myriophyllum verrucosum*, *Cyperus lucidus*, *Triglochin procera*, other *Eleocharis* species and several *Potamogeton* species.

On the other hand, a number of water plants have only limited ranges - these are the species which aren't adapted to dispersing themselves over distances. In many cases they occur in areas where wetlands were once close together but with continued drainage of wetlands are now restricted to residual wetlands with no opportunity to spread beyond any more. These are the species which we should be putting extra care into salvaging, not the widespread and successful survivors (although they have their place). Conservation of wetland wildlife isn't just a matter of protecting the animals; we need to preserve and encourage diverse wetlands, too.

Nick Romanowski, **Dragonfly Aquatics** (Wetland nursery), COLAC.

Thank you Nick for pointing out our mistake and for your advice. As it is nearly impossible to determine the genetic history of species, and given that many species vary markedly between sites, the general policy of LFW is to direct members to local native sources. Editor.

Roadsides, Rivers and Remnants - Wildlife conservation in remnant vegetation of northern Victoria.

A new research project, started in 1991 by the Wildlife Branch of the Department of Conservation and Environment, is studying the conservation of wildlife in remnant vegetation of the northern plains of Victoria. Possums and gliders, birds, bats and reptiles are being systematically recorded in more than 170 study sites across the plains. These sites are located on roadsides, in streamside vegetation and in remnants - large and small, on private and public land.

The project has three broad aims: (i) to study the effects of the loss, fragmentation and management of woodland habitat on these various groups of wildlife; (ii) to understand more of the ecology and conservation of wildlife in grassy woodlands; and (iii) to describe the ways that wildlife survives within, and can contribute to the well-being of, the rural environment.

Why work in the northern plains?

The northern plains have been chosen for this research for several reasons. Firstly, native grasslands and grassy woodlands (of Grey Box, Yellow Box, Red Gum, Buloke etc.) that are characteristic of the region have been cleared to a greater extent than any other major vegetation type in the State. In many areas, small remnants in paddocks, or strips along roads and streams, are all that remain for most wildlife species to live within. Secondly, there have been major changes to the native fauna of the region. A number of formerly resident species, such as Pig-footed Bandicoot, Rabbit-eared Tree Rat, Eastern Quoll and Rufous Bettong, are extinct and many others are now threatened and declining in status. Our knowledge of the ecology of many species characteristic of grassy woodlands is poor. Thirdly, the remnants that do survive provide a good opportunity to study the effects of habitat fragmentation on different species, and the conservation of wildlife in rural environments.

Study sites are located in regional clusters, including the Gunbower - Mitiamo area, Barmah - Nathalia area, Benalla - Violet Town area, Longwood area and west of Rutherglen.

What are the results so far?

The first group of species to be studied were possums, gliders and owls that were surveyed by spotlight censuses at night, during April to July 1991. Overall, five species of possums and gliders (Common Brushtail Possum, Common Ringtail Possum, Squirrel Glider, Sugar Glider), Koala, and six species of night birds (Southern Boobook, Barn Owl, Barking Owl, Powerful Owl, Tawny Frogmouth, Australian Owlet-nightjar) were recorded. Other nightjars (e.g. White-throated) may be present during spring-summer.

Common Brushtails and Common Ringtails were the most widespread mammals, while Southern Boobook and Tawny Frogmouth were the most common night birds. In contrast, the Barking Owl and Powerful Owl were rare, and recorded from only one and two sites respectively. Barn Owls were seen in open farmland, such as that west of Echuca, rather than in remnant woodlands. It was pleasing to detect the Squirrel Glider, a threatened species, at 13 sites, including both roadsides and small remnants. Characteristically, these sites had older trees with hollows, and were linked with other woodland areas. Sugar Gliders and Koalas were found at surprisingly few sites (4 and 5 sites). Data on the species and numbers of trees, the size and isolation of remnants, management history and other site characteristics are being collected for further analysis of distribution patterns.

Field studies on birds and bats are underway, and work on reptiles will begin in February. Birds are being censused at each site in spring (Sept - Dec 1991) and autumn (April - June) periods, to allow identification of seasonal changes in abundance. Bats are being recorded over summer months when they are most active. Ultra-sonic bat detectors linked to cassette recorders are used to monitor the amount of activity by bats in different types and sizes of remnants. Trapping with bat traps at a more limited number of sites will allow collection of data on the abundance of different species, their biology and feeding patterns.

News on progress with this research and interesting results that are obtained will be reported in future issues of the LFW Newsletter. Dr Andrew Bennett, DCE

Possum & Glider book

Identification of the forest habitats of possums and gliders in Central Victoria by David Lindenmayer et al, (1992). 44 pages. Describes methods of observing possums and gliders in tall eucalypt forests and what to look for to locate four species. Cost: $10.00. Available from Dr Mick Tanton, Dep't of Forestry, The Australian National University, Canberra, ACT, 2601.