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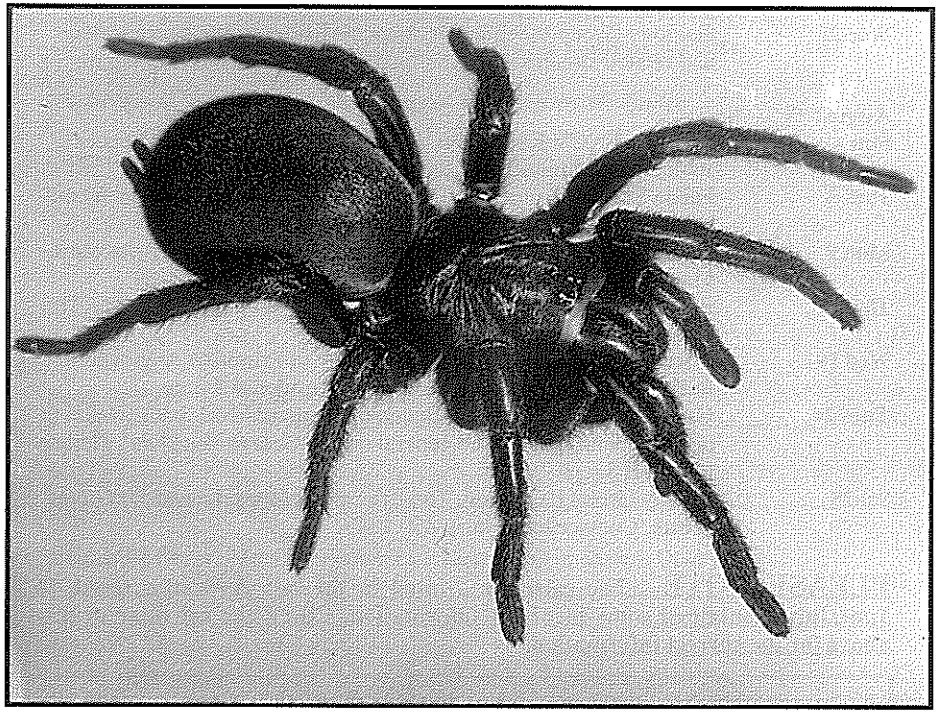

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# Design and use of Planting Zones at the Organ Pipes National Park

*Notes on research and planning for the first 20 years*

Barry Kemp* and Robert Irvine**

**Abstract**

The planning of this pioneering revegetation project is described showing the use of 'planting zones' for different indigenous plant species. Historical literature, geological surveys and regional observations are used as criteria for the design of these zones. The success of the Organ Pipes National Park restoration can be measured by the increased number of species present, the more diversified faunal habitat created and the appearance of the Park, which has now begun to resemble descriptions of the area given by early settlers.

## Introduction

Since 1973, planting of indigenous species has been carried out at Organ Pipes National Park following guide-lines designed to preserve the existing gene pool and re-create the pre-European plant communities. An overview of the project can be found in Edwards (1974) and Anon (1982).

While many people have been involved in planting, most of the research, planning and collection of propagation material has been done by a volunteer group known as the Friends Of Organ Pipes National Park (FOOPS), a sub-group of the Victorian National Parks Association. Support work and advice have been provided by the Department of Conservation and Natural Resources.

This report outlines the research and planning carried out for the revegetation of Organ Pipes National Park. Propagation and planting techniques are not covered; nor weed and vermin control (conducted by Park staff).

* 79 South Boambee Rd., Coffs Harbour, NSW 2450
** 11 Mudie Ave., Sunbury, Vic. 3429

## Guidelines

When the Park was declared in March 1972 there was no documented policy on indigenous plantings in national parks. The Organ Pipes National Park project was to become the first Australian restoration using solely indigenous species (J. Willis pers. comm.).

An interim policy on revegetation of Organ Pipes National Park was put in place in August 1972 until guide-lines for revegetation in National Parks were developed fully (National Parks Service 1988). This required that only local propagating material (eg. seed and cuttings) should be used; this material should be collected from within the Park and seedlings should be planted where they would have naturally occurred.

In cases where the population of a species is small, the guide-lines allow for the collection of material outside the Park. This should maintain the genetic diversity of the species and prevent in-breeding. At Organ Pipes National Park most of the material has been collected within 20 km of the Park (Fig. 1).

## The Site

Organ Pipes National Park covers an area of 85 ha, 32 km north-west of Melbourne, Victoria (37° 40'S, 144° 45'E). Initially, 65 hectares were donated to the National Parks Service to preserve geological features exposed by Jacksons Creek, including the so-called Organ Pipes. The land was proclaimed a National Park in 1972.

At that stage it had been a much neglected farm in a long-settled area. About 90% of the site was covered with weeds, including African Boxthorn (*Lycium ferocissimum*) and Spanish Artichoke (*Cynara cardunculus*). It was

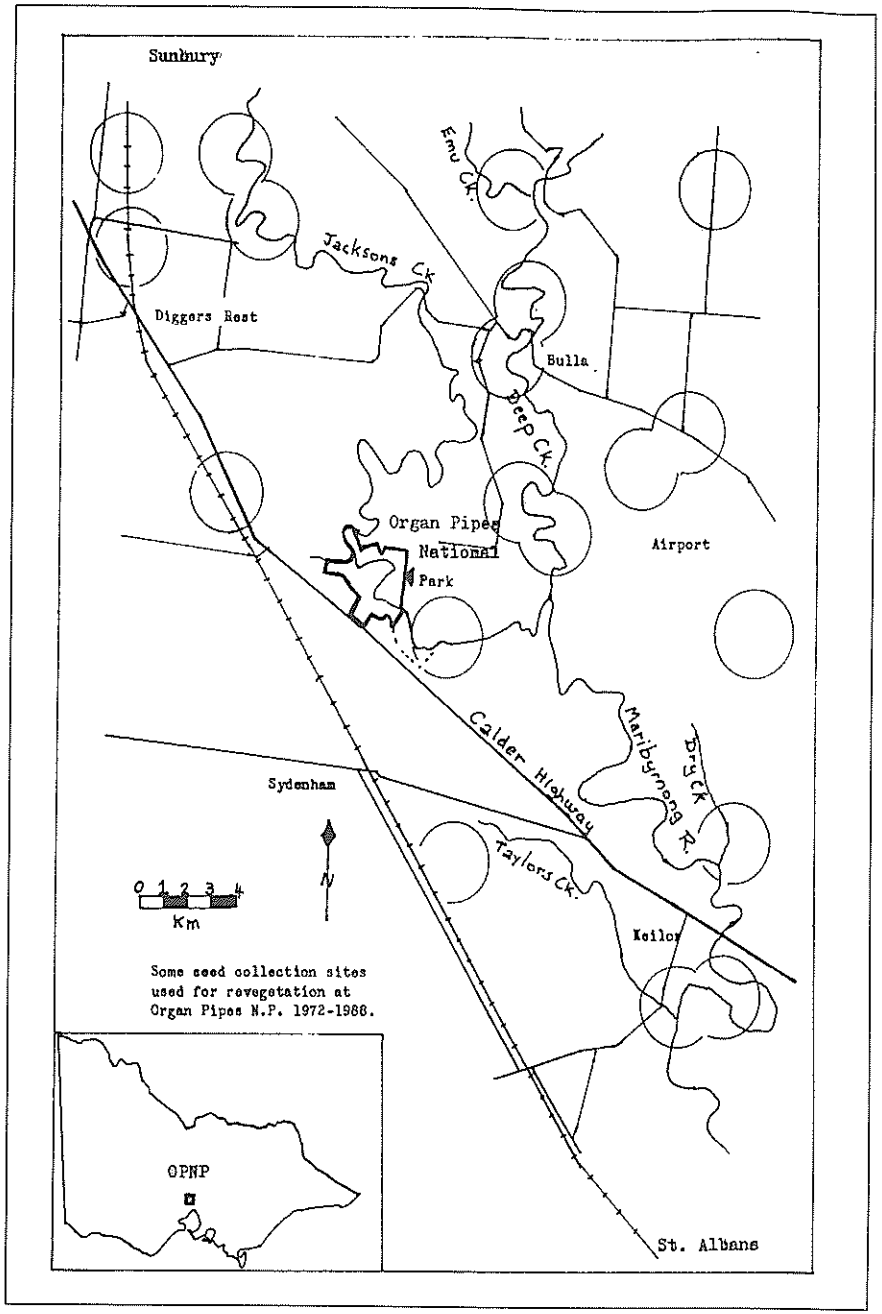


**Fig. 1.** Some seed collection sites used for revegetation at Organ Pipes National Park 1972-1988.





**Photo 1.** Organ Pipes National Park photographed in 1978.

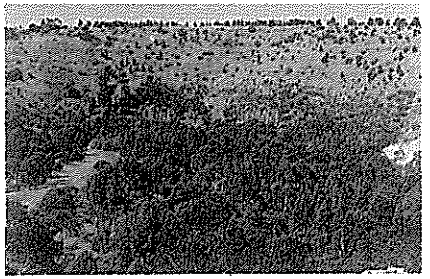

**Photo 2.** Organ Pipes National Park photographed in 1990.

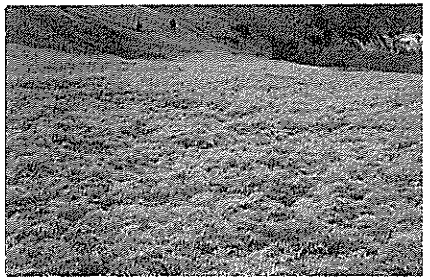

**Photo 3.** Spanish artichoke infestation photographed in 1978.

infested by rabbits and other vermin, and the soil was badly eroded (Edwards 1974). Few native plants or animals survived except where some protection was provided by rock crevices or creek banks. Several adjacent properties with similar weed and vermin problems have since been added. Future planned additions will bring the area of the Park to 250 ha.

*Geology*

The geology and geomorphology of the area are important determinants of vegetation (Wilk *et al.* 1978). They were studied carefully by FOOPS to ensure that the areas planted in the Park had growing conditions similar to those areas which served as seed sources.

The geology is characterised by a series of upper-Tertiary basaltic flows overlaying a sedimentary basement of Ordovician to Silurian sandstone shale and conglomerate beds (Sutton 1916; Wilk *et al.* 1978) (Fig. 2). Along the valley of Jacksons Creek, the sedimentary basement is exposed with the basalt commonly forming steep cliffs above (Sutton 1916). Recent alluvial deposits occur in broad flats along the valley floor and there are higher level terrace and colluvial deposits (James 1920; Wilk *et al.* 1978).

Basalt-derived soils are formed *in situ* on the plains and on low to moderate gradient slopes (Sutton 1916). In the valley, basalt soils locally overlay sandstone as a result of slumping and creep. Sandstone- derived soils are generally shallow and of limited extent whereas deeper soils of mixed origin are present on alluvial flats (Forster *et al.* 1975, 1976).

All soils in the Park have undergone erosion to some extent and much of the colluvium is recent (Wilk *et al.* 1978).

*Climate*

The site is strongly affected by alternating cyclonic/anticyclonic weather systems. Typically, strengthening north winds are followed by a front, with a rapid change to south-westerly winds. Meteorological records at nearby Melbourne Airport indicate that strong north winds are more common in winter, and south-westerlies more common in summer (Bureau of Meteorology 1990). When north winds do occur in summer, they are very hot and dry. The average annual rainfall at Melbourne Airport is 575 mm. This is 87% of the average annual rainfall for Melbourne and is

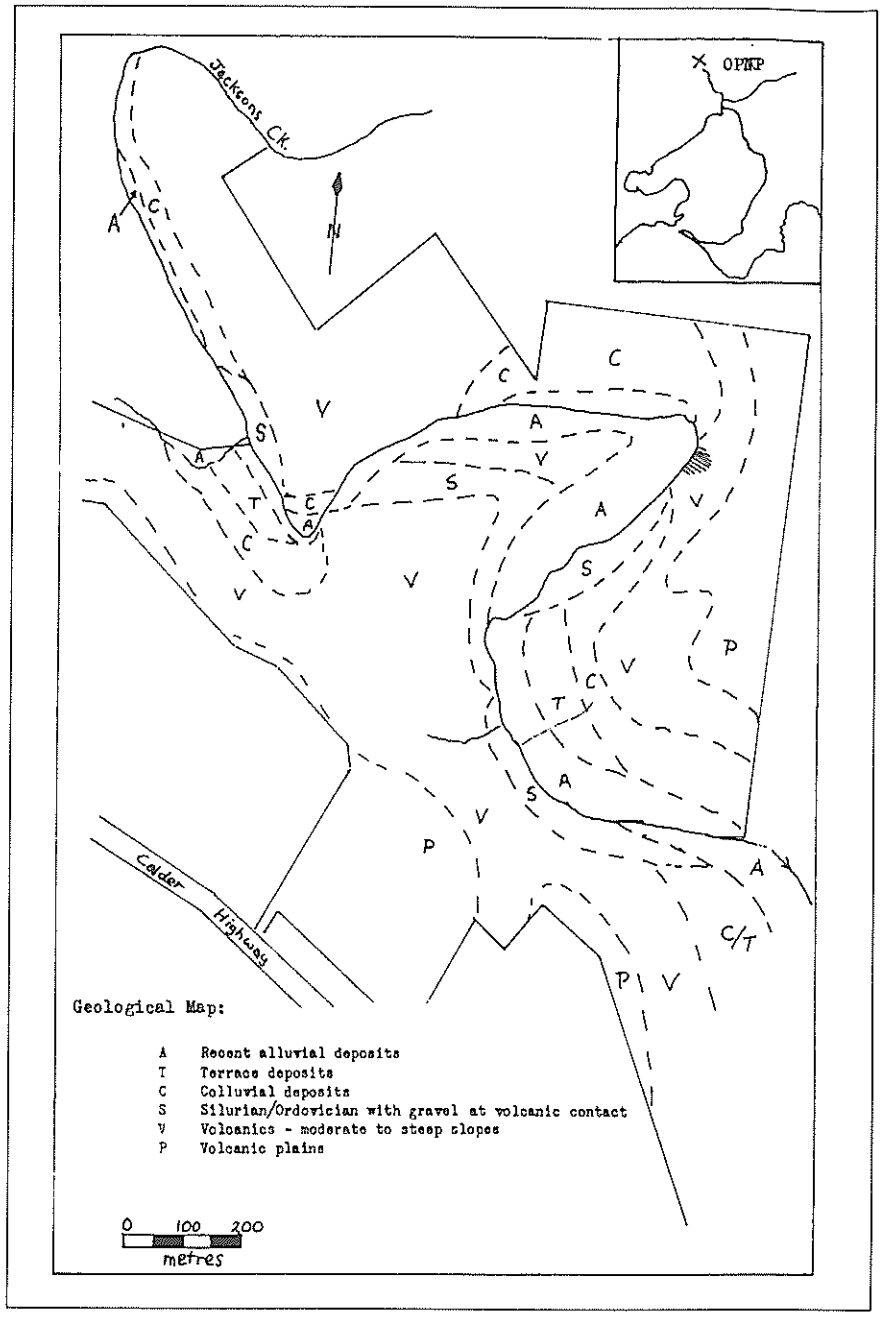


Fig. 2. Organ Pipes National Park Geological Map.





indicative of the relatively low rainfall on the Keilor Plains. Rainfall occurs throughout the year but there is normally a peak in spring. In summer and late spring, evaporation exceeds rainfall (Willis 1964). Moderate frosts occur during winter. An account of the region's climate is given by McDougall (1987) and Wilk *et al.* (1978).

Because of the steep slopes along Jacksons Creek, aspect is an important factor in the degree of exposure encountered by plants. Some slopes receive little winter sun while others receive full sun and are exposed to strong drying north winds.

*Vegetation*

The vegetation on the Keilor plains described by Sutton (1916) and Willis (1964) was an open tussock grassland, dominated by Kangaroo Grass (*Themeda triandra*), interspersed with small herbs, and scattered small woody species. Along watercourses, such as Jacksons Creek at Organ Pipes National Park, the vegetation would have been more luxuriant. Trees and shrubs were common because of better soil drainage and protection from strong winds (Sutton 1916).

Because of their open grassy nature and proximity to Melbourne, the Keilor Plains and the nearby valleys were rapidly exposed to grazing and agriculture following settlement in 1835 (Sutton 1916). By 1973, only fragments of native vegetation existed, often on railway easements or on steep valley escarpments (Edwards 1974; Rayner *et al.* 1984).

## Planning for Revegetation

The aim of the project was to restore the vegetation of the site to a near-natural condition. The restored vegetation would display examples of the regional flora, provide a reserve for locally or nationally threatened species, maintain a seed source for future work and increase the diversity of fauna habitat.

*Indigenous Flora*

Little of the original vegetation of the site remained as a guide to revegetation efforts (Edwards 1974; Rayner *et al.* 1984). To determine the natural distribution and structure of the vegetation for the Park a study was made by the FOOPS of historical accounts, scientific papers and notes by early botanists. This guided initial planning and subsequent amendments or additions.

Sutton (1916) recorded 440 species for the region, but Willis (1964) used a figure of 330 'true basaltic species' by not including those intruding from marginal areas or on inliers of granite or sandstone. Recent surveys and newly described taxons have added a number of other, mainly herbaceous species. Some historical accounts contained only a few brief references to the flora, but were still helpful. Excursion and research reports (Patton 1935) in *The Victorian Naturalist* (Hall 1900; Sutton and Armitage 1911; Nichols 1942; Garnet 1961) were invaluable. Early surveyors' maps, such as those of Wedge-Darke and Hoddle, occasionally contained botanical information (e.g. direct evidence of *Banksia marginata*, Silver Banksia, close to the Park). Often only vernacular or obsolete botanical names were used.

Some examples follow: (modern botanical names are inserted in square brackets)

'....encamped among native honeysuckle *[Banksia marginata]* and oak trees *[Allocasuarina verticillata]*....The plains are extensive, firm, grassy and skirted by light timber'. Alexander Fullerton Mollison, 1st August, 1837 (Mollison 1980), believed to be in the valley of Jacksons Creek, near the present town of Sunbury.

Isaac Batey (1907b) writing about the first years of settlement, recalled '....a belt of sheoaks *[A. verticillata]* about 4 miles in length, in parts a mile wide, and forming a dense forest....' The site has been identified, within 5 km of the Park.

'The country through which we travelled today consists of green hills and

valleys with a verdure of transparent green.... covered with rich and thick herbage and the trees she-oak *[A. verticillata]* and cherry tree *[Exocarpos cupressiformis]* and stunted gum *[Eucalyptus spp]*'. George Augustus Robinson, 10th January, 1840, on a route which is believed to have been close to the Park (Robinson 1840).

'....the charming Desert Cassia, *(C. eremophila) [Senna artemisioides]*. This plant, which is said to have occurred freely along the creek just here, is now only to be seen in situations where it is out of reach of stock', (Sutton and Armitage 1911).

**Photo 4.** Early plantings showing use of wire frames and hessian (1978).

*Seed Collection Sites*

In addition to searching through the available literature, the surrounding areas were explored for remnant plants to be used as seed sources. Small pockets of original flora were found at Taylors Creek, Dry Creek and Horseshoe Bend in Keilor, the banks and spurs of Deep Creek near the Melbourne Airport, the wooded Radar Hill, parts of Jacksons Creek south of Sunbury, at the Holden Flora Reserve, and along railway easements particularly from Tottenham to Sunbury (Fig. 1).

In the process, it became obvious that, even within the valleys the vegetation was not uniform, but varied greatly according to soil, drainage and aspect. For instance, *Senna artemisioides* (Desert Cassia), recorded in the Park area as late as 1961 (Garnet 1961) but absent in 1972, could be found only on north-facing sandstone slopes. The few remaining Yellow Gum *(Eucalyptus leucoxylon)*, including a single survivor in the Park, were on similar sites. It was apparent that both of these species should be planted on the warm sandstone areas of the Park. Further observations were made of the habitat preferences of many other indigenous species, some like the streamside association being fairly obvious, others more subtle.

**Planting Zones or 'What Goes Where'**

Sutton and Armitage (1911) suggested that the plants in this area fell roughly into two categories, those on exposed basalt plains and those in the river gorges. To FOOPS the emerging patterns of areas, each with a more or less distinct plant association suggested the Park could be divided into zones by relating the soils, drainage and aspect to other sites with remnant native vegetation. As well as helping to correctly place seedlings, this would simplify management of the planting process, which required two years forward planning. A number of simple habitat zones were delineated and prominent plants selected to give their names to each zone. With experience, changes were made. The system could apply directly to Park extensions or other local areas.

Details of zones currently in use are as follows: (Fig. 3).

*Red Gum Zone*

This zone consists of the alluvial flats and narrow creek banks which have deep soil and sheltered conditions.

Red gum *(Eucalyptus camaldulensis)* '....has almost undisputed possession of the water-courses, often extending in that way right up on to the open plain...' (Sutton 1916).

In 1972 investigation of the creek banks in the Park showed that they had been mostly cleared and vegetation was heavily suppressed by grazing. Despite this, reseeding by floodwaters meant that many original species persisted. Original spe-





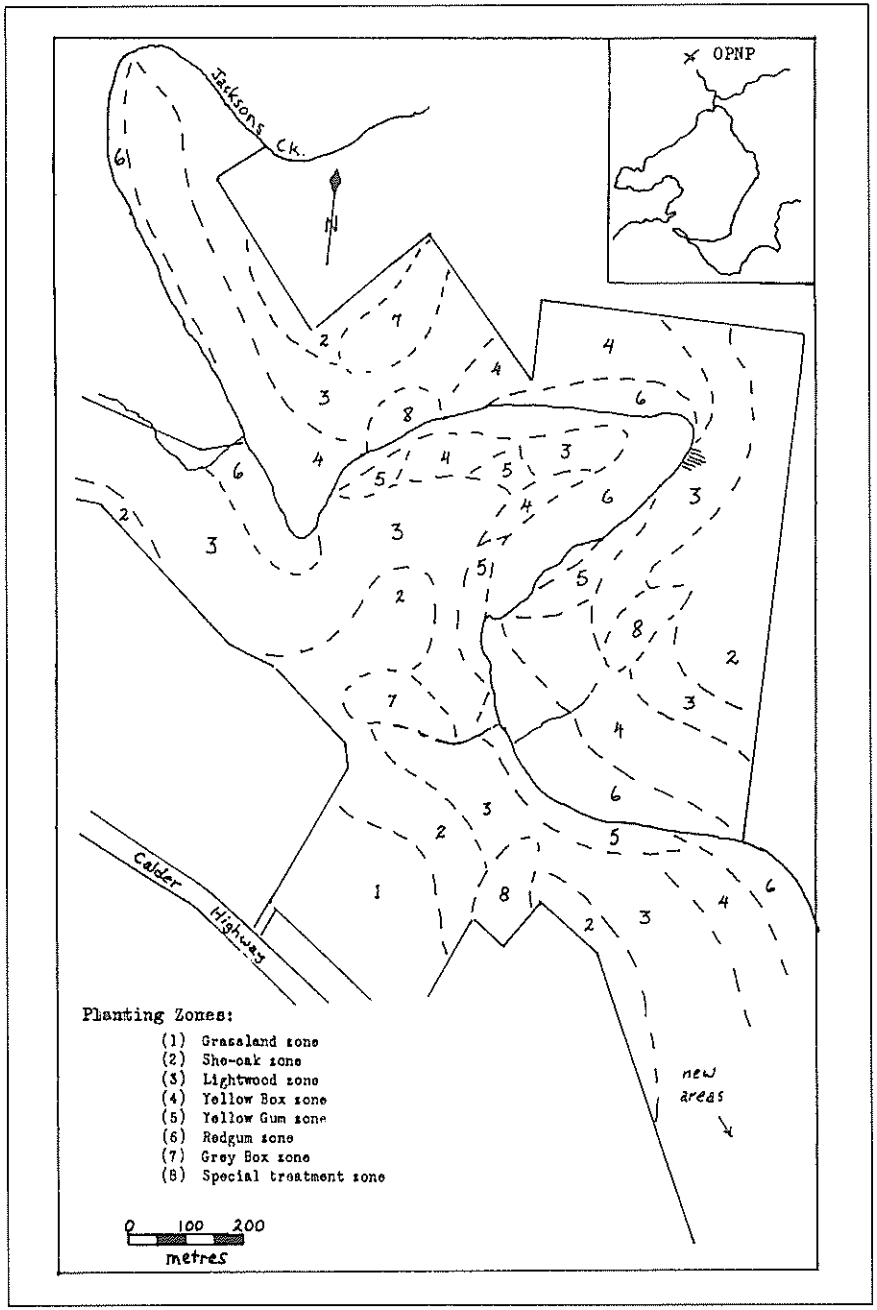


**Fig. 3.** Organ Pipes National Park Planting Zones.

cies, in addition to Red gums, were *Acacia dealbata* (Silver Wattle), *Acacia melanoxylon* (Blackwood) a few *Acacia verticillata* (Prickly Moses) and a single surviving *Acacia mearnsii* (Black Wattle), as well as *Hymenanthera dentata* (Tree Violet), *Callistemon sieberi* (River Bottlebrush), *Leptospermum lanigerum* (Woolly Tea-tree) and one *Viminaria juncea* (Golden Spray) (the only known survivor in the region).

*Eucalyptus viminalis* (Manna Gum) and *Acacia retinodes* (Wirilda) were found locally beside streams and on slopes close to streams, so were included for use in this zone. A sub-division of the planting zone could have been made, as *C. sieberi, L. lanigerum* and *A. dealbata* proved to be dependent on a steady supply of moisture from the creek. However, these were simply positioned closer to moist areas at planting time. To a large extent, the aquatic and semi-aquatic plants associated with the creek appear to have survived the sites agricultural history and have been given little attention.

*Yellow Box Zone*

This zone takes in the areas in the Park between the moist flats and the dry, crumbly slopes. These sites are relatively dry alluvial and colluvial soils over sandstone.

Two Yellow Box *(Eucalyptus melliodora)* trees were found in the Park on these soils and most other local examples of the species were on similar soils with varied exposure, surviving mainly as single trees on the slopes. Few other native plants survived in this zone in the Park; mainly *Danthonia* spp (Wallaby-grasses), and a single *Bursaria spinosa,* (Sweet Bursaria).

Outside the Park, similar areas had *Hymenanthera dentata, Acacia implexa* (Lightwood), *Acacia acinacea* (Gold dust Wattle), *Acacia mearnsii* (Black Wattle), *Myoporum viscosum* (Sticky Boobialla), *Myoporum insulare* (Coast Boobialla), *Eremophila deserti* (Turkey Bush) and occasionally *Cassinia longifolia* (Shiny Cassinia). *Themeda triandra* (Kangaroo Grass) was present on one site.

*Banksia marginata* (Silver Banksia) appears frequently in old reports (usually as 'Honey suckle') and surveyors' maps, with records in the valleys and on the plains. The closest survivors in 1972 were 20km north of the Park. We have successfully re-established this species in this zone.

Some species have appeared in this zone that were not obvious in 1972 including *Dichanthium sericeum* (Silky Blue-grass) and the saltbushes *Enchylaena tomentosa* (Barrier Saltbush) and *Einadia nutans* (Nodding Saltbush).

*Yellow Gum Zone*

This zone is on the lower slopes, on sandstone with shallow soil, and mainly on north-facing aspects.

Yellow Gum *(Eucalyptus leucoxylon)* 'climbing well up the steep rocky banks.... has not been noticed on the plains' (Sutton, 1916).

Willis (1964) excluded this species from his basalt plains list. All surviving examples known including a single tree in the Park and a stump confirmed to be of the species are on warm sandstone slopes. In the Park, a single *Zygophyllum glaucum* (Pale Twin-leaf) grew near the Yellow Gum, and on similar sites there were a few *Ptilotus spathulatus* (Pussy-tails), *Maireana enchylaenoides* (Wingless Bluebush), *Enneapogon nigricans* (Pappus Grass) and *Dichanthium sericeum.*

Beyond the Park, other species accompanying Yellow Gum included *Senna artemisioides* (Desert Cassia), *Eremophila deserti, Acacia pycnantha* (Golden wattle), *Rhagodia parabolica* (Fragrant saltbush), *Acacia acinacea, Einadia hastata* (Saloop), *Einadia nutans* and *Exocarpus cupressiformis.*

Grasses that have been established or naturally recolonised include *Enneapogon nigricans, Dichanthium sericeum* and some *Danthonia* species.

*Grey Box Zone*

In the Park this zone is on basalt soils





that allow good drainage without drying out too rapidly in summer.

Grey Box *(Eucalyptus microcarpa)* ,'....not found on the sands or Silurian, is next in importance to the redgum, and is somewhat exclusive. It is sparingly distributed over the eastern part (of the plains) but .... near Melton and Bulla it forms open, pure forests of limited extent' (Sutton 1916).

No Grey Box remained in the Park, but it is still well represented near Bulla and a group survives in the valley within 1km of the park. Good drainage and at least moderate soil depth seem important for the Grey Box (Wilk *et al.* 1978). Two selected areas of dark basalt soil with moderate southerly slope have proved successful whilst a third, on heavier soil, has resulted in slow growth.

Except for some *Danthonia* spp, no native plants are recorded as survivors in this zone. But near Bulla, Grey Box is accompanied by a few *Allocasuarina verticillata* (Drooping She-oak), *Acacia implexa, Acacia pycnantha, Acacia acinacea, Acacia paradoxa* (Hedge Wattle), and *Bursaria spinosa.* A wide variety of grasses and forbs may be found with the Grey Box at Bulla, including *Themeda triandra, Danthonia* spp. and *Stipa* spp. (Spear-grasses), *Dianella* spp (Flax-lilies), saltbushes (Chenopodiaceae), *Brachyscome dentata* (Lobe-seed Daisy) and *Wahlenbergia communis* (Tufted Bluebell).

*Lightwood Zone*

This zone occurs on the harsh, windswept rocky slopes of the upper parts of valleys where there is often little soil. There may be many cracks in the basalt or loose rubble.

Lightwood *(Acacia implexa)* is still fairly widespread on the Keilor Plains in this habitat. In the Park, there were still a few Lightwoods, and in places *Dodonaea viscosa* ssp. *cuneata* (Wedge-leaf Hopbush), *Clematis microphylla* (Small-leaf Clematis), *Wahlenbergia communis, Dianella revoluta* (Black-anther Flax-lily), *Pleurosorus rutifolius* (Blanket Fern), *Cheilanthes distans* (Bristly Cloak-Fern) and *Pellaea falcata* (Sickle Fern). Sutton (1916) noted ferns in the basaltic columns and amongst rocks. More recently, following weed control, *Nicotiana suaveolens* (Austral Tobacco) became evident as did grasses including *Dichanthium sericeum, Bothriochloa macra* (Redleg Grass), *Stipa* spp, and *Danthonia setacea* (Bristly Wallaby-grass).

Plants noted on similar sites outside the Park (Nicholls 1942) include *Bursaria spinosa, Hymenanthera dentata* and the Murray Pine *(Callitris glaucophylla). Correa glabra* (Rock Correa) is sometimes found tucked under rock outcrops and *Clematis microphylla* is common, scrambling over rocks and shrubs.

*She-oak Zone*

Our selected zone includes the shallow soils of the upper valley-slopes and extends a short distance onto the plains.

'....belts of sheoaks *[A. verticillata]* on the uplands above, extend along each side of the river....' Batey (1907a).

'The Casuarina *[A. verticillata]* were undoubtedly more numerous in the past .... 'Sutton (1916).

*A. verticillata* was a widespread but unevenly distributed component of the plains flora (Batey 1907a; Sutton 1916). Early survey maps show the immediate vicinity of the Park to have been thinly wooded with She-oak and there were extensive stands 5-10 km to the north. Not many She-oaks have survived ['being a principal timber tree... have almost disappeared' (Batey 1907a)], none closer to the Park than about 3 km (Kemp 1987). The evidence suggests they preferred well-drained areas on low hills and the edges of valleys, occasionally in the gorges and sparsely over the plains (Sutton 1916).

In this habitat within the Park, few native plants except *Danthonia* spp, and *Dichondra repens* (Kidney-weed) survived. *Dichanthium sericeum* is now spreading

into the zone.

Outside the Park, no good examples of *Allocasuarina* woodland could be found. With the exception of *Callitris glaucophylla* and *Correa glabra,* plants from the Lightwood zone were sometimes seen on sites similar to the She-oak zone in the Park.

We believe this zone is the transitional area bordering the largely herbaceous tracts dominating the plains, and thus would have included areas where *Allocasuarina* and other woody plants were scattered, and *Themeda* grassland was prominent.

*Grassland Zone*

This zone comprises the heavy-soiled, poorly-drained surface of the basalt plains.

The Keilor plains are described as having always been open, dry tussock grassland with many herbs and few woody species (Sutton 1916; Willis 1964).

'..from early October....the grassland is transformed into carpets of colour - chiefly yellow or white from the massed blooms of *Bulbine, Anguillaria, Goodenia, Brachycome, Calocephalus, Craspedia, Podolepis, Leptorhynchos* and *Helichrysum* species.' (Willis 1964).

Even on these apparently featureless plains there are subtleties of plant distribution caused by drainage patterns and other factors that require further research. Plants which favour the better drained areas include *Pimelea glauca* (Smooth Rice-flower), *Kennedia prostrata* (Running Postman), *Ptilotus* spp., *Chrysocephalum semipapposum* (Clustered Everlasting), *Dillwynia cinerascens* (Grey Parrot-pea), *Convolvulus erubescens* (Blushing Bindweed), *Eryngium ovinum* (Blue Devil) and *Vittadinia cuneata* (New Holland Daisy). Among plants which favour wetter sites are *Mentha diemenica* (Slender Mint), *Craspedia glauca* (Billy Buttons), *Helichrysum rutidolepis* (Pale Everlasting), *Brachyscome basaltica* (Basalt Daisy), *Haloragis heterophylla* (Varied Raspwort), *Calotis* spp (Burr Daisies), *Eryngium vesiculosum* (Prickfoot), and *Juncus flavidus* (Yellow Rush).

Increased efforts are now being made to re-establish the wide range of herbaceous and small woody plants which still precariously survive on the plains. In the original Park few areas were suitable. Early attempts with transplants and seedlings were unsuccessful due to problems such as moisture stress in the first summer and competition from weeds that germinate when the soil is disturbed. Newly established areas of *Themeda triandra* (Kangaroo Grass) are providing a more suitable environment for further re-introductions (McDougall 1989). There is also natural recovery of native grasses notably *Danthonia* spp. on the selected site.

A cultivated plot containing some of the grassland species has been established to secure a seed source, and there are plans to focus more attention on re-creating an area of grassland vegetation, with particular emphasis on rare species. Some expected additions to the Park may allow extension of this work.

*Special Zones*

These zones are areas where there are unusual conditions or a range of conditions within a small area. Not all of these have been defined on the plan (Fig. 3), but their special nature is self evident, e.g. the features known as Rosette Rock and the Tessellated Pavement. Surviving precariously on Rosette Rock are *Helipterum anthemoides* (Chamomile Sunray) and *Pelargonium australe* (Austral Stork's-bill). Their survival there is believed to be not solely because they are out of reach of grazing animals, as both have been noted on similar rocky slopes, but not on rail reserves or other 'plains' areas. *Bulbine bulbosa* appears on basalt cliffs in the Park, both of northerly and southerly exposure, and is also found on the plains. The rocky pavements are home to several interesting plants, including *Calytrix tetragona* (Fringe Myrtle), found





locally on only a few similar creek-side basalt outcrops, and *Tripogon loliiformis* (Rye Beetle-grass) a diminutive 'resurrection' grass, which is regarded as being rare in Victoria.

**Twenty Years of Revegetation**

*Discussion*

The visual changes have been so dramatic that visitors to the Park are surprised when told that twenty years ago the site was covered with boxthorn, thistles and rubbish. To a large extent, the natural appearance of the Park is due to the zoning system which guided selection and placement of seedlings. It is interesting to note that in some areas where spacing plants too closely was suspected, self sown seedlings are filling the gaps.

Animals which frequented the area in the past are returning, including species no longer recorded in the area by 1846 (Batey 1907b) such as Eastern Grey Kangaroo *(Macropus giganteus),* Swamp Wallaby *(Wallabia bicolor)* and Short-beaked Echidna *(Tachyglossus aculeatus).* The recent successful re-introduction of Sugar Gliders *(Petaurus breviceps)* is an indication of the extent to which fauna habitat has been restored. There have been large increases in bird sightings, which now number eighty five species. FOOPS have installed bird and bat boxes to encourage further increases in fauna numbers.

The planting zones would have failed without the continuous weed control work done by the Park staff. The soil seed-bank is such that the above-ground removal of one weed such as Artichoke Thistle is usually followed by germination of another such as Phalaris *(Phalaris aquatica)* and Serrated Tussock *(Nassella trichotoma).*

In total 124 native plant species, including 17 classed as rare in the Melbourne area (Beauglehole 1983), have been recorded in the Park since it was proclaimed; 58 other indigenous species (propagated from local material) have been re-established since and persist.

A high survival rate has been achieved even though the plants are left to themselves after planting in wire and hessian frames. A number of species are self-seeding including *Acacia paradoxa, Eucalyptus microcarpa, Einadia nutans, Themeda triandra, Dichanthium sericeum* and *Acacia retinodes.* The FOOPS are currently studying species which are not self-seeding. For the last two years a detailed analysis has been undertaken to discover why *Allocasuarina verticillata* has produced only a few seedlings in the Park.

The planting zones have proved worthwhile for planning restoration of plant communities in Organ Pipes National Park as they enabled simple locating of plants rather than complex individual plans for hundreds of different species. The understorey in the planting zones must be now added. It was neglected in the first plantings and will be a great challenge over the coming decades. Further work is also needed in the grassland zone. New techniques will have to be developed to successfully replace the abundant perennial weed grasses by the natural native herbs of each planting zone.

**Conclusion**

When the Organ Pipes National Park was declared in 1972 it had long been famous for its geological significance (Rosengren 1987). Today the Park could be seen as equally valuable for its botanical significance and as an example of restoration of an indigenous plant community. The age of the project and its pioneering policy of using solely indigenous species is an excellent model for other revegetation projects.

The revegetation project at the Organ Pipes has been an outstanding success as indicated by the diversity of indigenous species now found in the Park.

A complete list of plant species in the Organ Pipes National Park compiled by Barry Kemp, Rosemary Myers, Lindsay Jolley and Keith McDougal was published in 'A guide for teachers and

visitors' 1992 by the Department of Conservation and Environment.

Woodlands of trees and shrubs now provide excellent habitat for native fauna where 20 years ago noxious weeds and rabbits prevailed. Natural regeneration of trees and shrubs is now occurring where the rabbit population has been controlled, but these pests are still a major problem. Native grasses particularly *Dichanthium sericeum, Bothriochloa macra* and *Danthonia* spp. are naturally spreading, whilst *Themeda triandra* and a growing list of herbs have been re-established. Recently added properties will allow scope for many more re-introductions.

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