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CONSERVATION OF PENCIL PINE COMMUNITIES ON THE CENTRAL PLATEAU

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Most visitors to the lake country of Tasmania's Central Plateau region would agree that the area attains much of its charm from the thousands of lakes and tarns which are often surrounded by small stands and occasionally forests of native Pencil Pines. In fact, it is these features which make this region unique in Australia, the Southern Hemisphere, and arguably the world.

This article draws attention to the degraded state of Pencil Pine *(Athrotaxis cupressoides)* forests on the Central Plateau. Their degradation has been brought about by two factors, both of which can be attributed to the activities of European settlers; fire and overgrazing.

Large areas of *A. cupressoides* have been destroyed by fire (Jackson 1973) and there appears to be little or no regeneration on these sites. Increases in forestry operations, hydro-electricity development, and the roading activities associated with these works have increased the chances of many remaining stands being burnt. Also, the general upsurge in wilderness recreation and trout fishing has increased the potential threat from fire. Consequently there is concern for the conservation of the species.

Pencil Pines have a widespread but discontinuous distribution in central, western, and southern Tasmania, at altitudes between 630 and 1320m a.s.l. (Fig 1). They are most common on the Central Plateau and in the Central Highlands and at Mt Field but, there are also populations in the West Coast Range, the King Williams, Frenchman's Cap, Mt Anne, Lake Skinner in the Snowy Range, Pinders Peak, and Precipitous Bluff. Pencil Pines usually grow to be upright trees between 6 and 20m in height, sometimes taller, with larger individuals having a butt diameter well in excess of 1m. At high altitudes and in the more southerly extent of their range, Pencil Pines occur as stunted trees or in a prostrate form. A few extensive forests and many scattered stands of Pencil Pines occur on parts of the Central Plateau, in the Central Highlands and at Mt Field at around 1000m a.s.l. Elsewhere they tend to be restricted to small stands around tarns and bog margins, along streams, and on dolerite block streams. These stands usually comprise areas of less than 1 ha. At their lowest densities, Pencil Pines are found beside streams which have transported seed from higher altitude populations.

Pencil Pines are extremely slow growing tres. It takes, on average, 55 years for a seedling to reach 1m tall (Ogden 1978). However, they are capable of living for a very long time and trees in excess of 1000 years old are common.

There is considerable variation in the structure and floristic composition of forests dominated by Pencil Pines throughout Tasmania. Pencil Pines are often found as the sole dominant in open montane rainforests on the Central Plateau (see Jarman *et. al,* 1984 for definitions of Tasmanian rainforest types) or it may be found with Snow Gum *(Eucalyptus coccifera),* Yellow Gum *(E. subcrenulata),* Deciduous Beech *(Nothofagus gunnii),* Myrtle *(N. cunninghamii),* Sassafras *(Atherosperma moschatum),* Celery Top Pine *(Phyllocladus aspleniifolius),* Milligan's Leatherwood *(Eucryphia milliganii),* and King Billy Pine *(Athrotaxis selaginoides)* in a variety of open montane, implicate and thamnic rainforest types. Communities dominated by Pencil Pines are described in Jarman *et al.* (1984), Cullen (1987), Jackson (1973), and Kirkpatrick (1977, 1984a and 1984b).

The distribution pattern of Pencil Pine is explained by the ability of the species to tolerate extremely low temperatures (by Tasmanian standards) (Cullen and Kirkpatrick, 1988a; Sakai *et.al.* 1981). The Central Plateau and the Central Highlands are the only large areas in Tasmania which are capable of supporting extensive natural populations of Pencil Pine, under present climatic conditions. However, their present distribution and fossil evidence suggests that Pencil Pine forests were probably widespread at lower altitudes in southern and western Tasmania during the colder climates of the last glacial and preceeding interstadial (Cullen, 1987).

Cullen (1987) identified 6 forest types dominated by Pencil Pine, of which 3 have only been recorded in the Central Plateau Protected area or the Walls of Jerusalem National Park. These 3 types, namely open montane rainforest with Pencil Pine over grassy understories (eg Dixon's Kingdom stands), open montane rainforest with Pencil Pine over bog understories, and open montane rain-

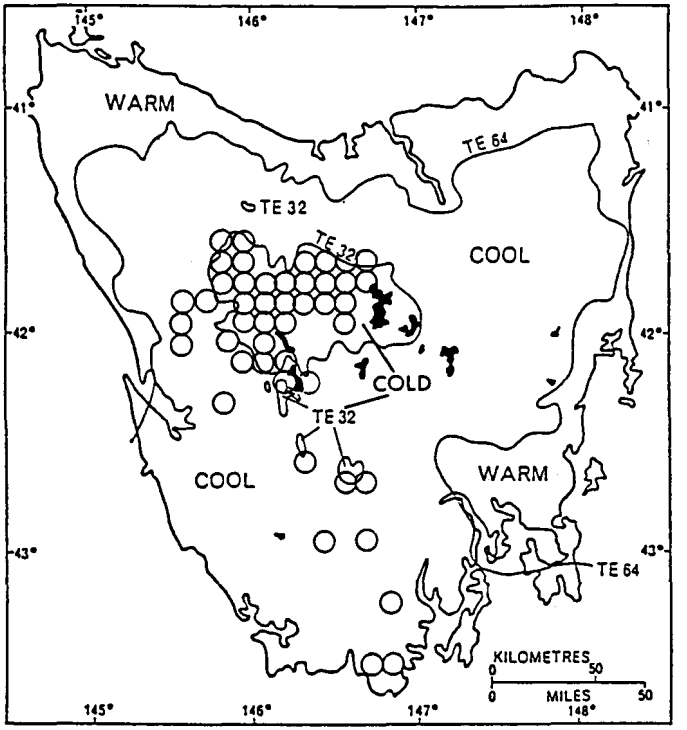

Figure 1. The distribution of *A. cupressoides* and temperature efficiency: *A. cuppressoides* distribution taken from Brown et al. (1983) and updated. Temperature efficiency provinces after Gentilli (1972). Circles indicate areas where the species is known to occur.

forest with Pencil Pine over scrub and heath (eg the roadside stand at Pine Lake), occur in the most easterly portion of the species' range. They owe their structure and floristic composition to the lower precipitation and colder temperatures experienced in this region. Higher precipitation, different topography, and less frost combine to create an environment which promotes very different Pencil Pine forests, usually characterized by Deciduous Beech *(Nothofagus gunnii).*

A survey of the distribution of Pencil Pine throughout Tasmania reveals that 33% of the area supporting Pencil Pines on the Central Plateau has been burnt in the 1960/61 and subsequent fires. There have been many older fires which have also burnt areas of Pencil Pines but is difficult to trace the boundaries of these. In fact it is very hard to find a stand anywhere on the Central Plateau which does not contain at least some fire-killed trees.

More alarmingly, the Central plateau stands generally show a lack of regeneration which extends back for at least 100 years. Detailed information concerning size and age of individuals in Pencil Pine populations was collected at 40 sites throughout Tasmania. Many of the stands sampled on the Central Plateau have either a complete lack, or only very low numbers, of seedlings and saplings up to 2m high. This situation is most pronounced in stands with grassy understories. The time taken to attain this height would well exceed 50 years, as seedlings are, on average, less than 1m high at this age.

It appears that conditions suitable for the germination of Pencil Pine seedlings are abundant in the region (Cullen and Kirkpatrick, 1988b) as densitites of between 50 and 100 per square metre were recorded at many sites following the seed year of 1982/83. Pencil Pines only produce seed once every 5-6 years when there is a mass flowering of all trees. Therefore, it is likely that either climatic conditions are not suitable for the establishment of these seedlings or they are being destroyed by grazing by introduced and/or native mammals. Sheep and cattle were introduced to the Central Plateau region by 1830 and rabbits were introduced around 1910 (Shepherd, 1974). The stands with grassy understoreys would be most attractive to grazing animals and this would explain the total absence of seedling in these stands. By contrast, the stands with heath and scrub understoreys on dolerite block fields have a lower abundance of grass and herbs and are probably less attractive to grazing animals, this would explain the low levels of regeneration present in them.

A series of six 1m x 1m enclosures were established at Mickeys Creek and Pine Lake to test if the removal of grazing pressure would enhance seedling survival. At the onset of the trial, the number of seedlings present in each enclosure and on an adjacent, similar unenclosed 1m x 1m plot were counted. Seedling numbers were monitored every 3 to 6 months for approximately 3¼ years. The protective effect of the enclosures is demonstrated in Table 1. In all cases the numbers of unprotected seedlings decreased by greater amounts than the number of seedlings inside the enclosures. The results are statistically significant (see Cullen and Kirkpatrick 1988a) and indicate that grazing pressure has been

Table 1. The effect of grazing over a 3¼ year period on Pencil Pine seedlings on the Central Plateau.

Location	Mickeys Creek				Pine Lake	
Plot no	1	2	3	4	1	2
Enclosed seedlings						
No. seedlings at start	80	50	270	11	36	37
No. seedlings after 3¼ years	68	49	69	239	48	37
% change	-15	-2	-74	+110	+33	0
Unenclosed seedlings						
No. seedlings at start	59	92	241	132	44	44
No. seedlings after 3¼ years	4	51	47	82	14	13
% change	-93	-45	-81	-38	-68	-70

responsible for loss of seedlings at the 2 sites investigated. It appears that the Pencil Pine seedlings were consumed at random along with the other vegetation, rather than preferentially, as many seedlings remain on the unprotected plots. Rabbit and wallaby dropings were collected on all the unprotected plots.

Records indicate that the drought season on 1987/88 was particularly severe in the area where these trials were carried out. The seedlings survived this drought with little or no losses and seedlings were recorded at a wide variety of sites in the area. It is therefore unlikely that drought has resulted in lowering of regeneration.

A survey of over 20 stands in the region revealed that there has been limited survival of Pencil Pine seedlings in most situations. Dung from sheep, rabbits, and wallabies was found in areas supporting Pencil Pine seedlings. The numbers of droppings can be confidently used as a measure of the number of animals using the area (Johnson and Jarman, 1987; Bakker *et.al.*, 1983). The high numbers of droppings counted at some sites are comparable to counts from other areas on the Central Plateau which experience high grazing pressure (N. Gibson pers. commun.).

In the past the numbers of sheep and cattle grazing on the Central Plateau were much higher. Shepherd (1974) estimated that each year approximately 350,000 head of sheep and 6,000 head of cattle were sent to the region in the late 1800's and some of the flocks remained over winter, even on the highest areas. He reports—"the numbers were kept high in order to produce 'hunger-fine' wool". Therefore it is reasonable to assume that grazing pressure during this period was very intense. Rabbits arrived on the Central Plateau around 1910 (Shepherd, 1974) and their rapid rise to plague proportions would have maintained and possibly increased the grazing pressure. They are still thought to be responsible for considerable damage to the vegetation of the region (Jackson, 1973).

As noted previously, the onset of the regeneration failure of Pencil Pine broadly coincides with the introduction of sheep and cattle to the region. This event also coincides with the destruction of the Tasmanian hunting and gathering culture. Archeological evidence (Kiernan *et al.*, 1983) and historical accounts (Cosgrove, 1984) indicate that wallabies formed an important proportion of the diet to the Tasmanian Aborigines. Aborigines frequented the Central Plateau on a regular basis, probably for about the last 10,000 years (Cosgrove, 1984; Thomas, 1984). Their activities, and those of the now extinct Thylacine, may have kept a check on wallaby numbers in the region.

In the absence of further evidence, the loss of Pencil Pine regeneration through grazing must be attributed to the combined effects of sheep, cattle, rabbit, and wallaby populations rather than to any one species. The role played by these species has most certainly varied through time. Sheep and cattle numbers have declined whereas the numbers of rabbits and most probably wallabies have risen during this century. Consequently, the pressure on populations of Pencil Pine seedlings has probably been maintained over a long period.

Intense sheep grazing of the Central Plateau has now ceased, but flocks of

sheep are still grazed in the area during the summer. This reduction in grazing pressure may be responsible for the low numbers of seedlings surviving at the stands investigated.

The effect of grazing on the regeneration of Pencil Pine is undoubtedly intensified by the intermittent seed production and extremely slow growth rates of the species. These factors, combined with the increase in wildfires since the arrival of Europeans and the dramatic upturn in the use of the Central Plateau for recreational purposes, are likely to place Pencil Pine populations in this area in long term danger of mass depletion. Should this happen the area will undoubtedly loose much of its natural charm. It is therefore paramount that sheep or cattle grazing should not be allowed to continue in areas supporting Pencil Pine populations. Despite knowledge of this situation and considerable evidence to prove that grazing in the high country is both environmentaly unsound an uneconomic, the recent State Government Select Committee into land-use on the Central Plateau has recommended that the grazing leases be renewed on the Central Plateau on areas above 1000m including regions where Pencil Pines are found.

Further loss of Pencil Pine populations through burning must also be avoided. The probability of wildfires on the Central Plateau must therefore be kept to an absolute minimum, and all available means must be used to suppress those which start. To this end it may be necessary to restrict vehicles access in some areas and to encourage walkers and fishermen to use fuel stoves. It may also be desirable to ban the use of campfires during high fire danger periods.

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TRAPPED SWALLOW LEADS TO GRISLY DISCOVERY

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On 1/10/88, I was alerted to the sounds of a trapped bird, scratching and fluttering in its attempts to escape from inside a wall cavity. Access had been gained via an opening at the top of the wall, measuring 200 x 400mm and at 2300mm above ground level.

The wall cavity measured 80mm in width, 740mm in length and 600mm from the opening to the bottom of the cavity. It was obviously too narrow to allow for flight, and the vertical surfaces too smooth to climb. On removing the outer cladding of the wall, the trapped swallow, *Hirundo neoxena* flew away, leaving its freshly dead companion to add to the carpet of mummified corpses within.

The total count of dead birds was 23, and included 17 Dusky Robins *(Melanodryas vittata)* 5 Welcome Swallows *(Hirundo neoxena)* and a single Flame Robin *(Petroica phoenicea)*. The specimens were all adult and had presumably accumulated over 14 years of the buildings existence, possibly becoming trapped whilst searching for nesting or roosting sites.

Specimens were lodged with the Queen Victoria Museum,Launceston Reg. No. 1988/2/83.

Thanks to Dr R.H. Green for assistance in ascertaining the age of the specimens.

FOOD OF THE GREY-BREASTED SILVEREYE

by R. H. Green†, T. J. Scarborough† and P. B. McQuillan‡
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The Tasmanian race of the Grey-breasted Silvereye *Zosterops lateralis lateralis* (Latham, 1801) occurs commonly throughout Tasmania and the Bass Strait islands, living in a range of habitat types from the coast to the upper limits of highland forests and in city and suburban gardens. Studies by Lane (1972) and Mees (1974) have shown that Tasmanian silvereyes migrate across Bass Strait, as far as New South Wales, for the colder months although part of the population over-winters in Tasmania.

The silvereye is one of Tasmania's most numerous native birds, but little is known of its dietary requirments and its ecological role, beyond casual observation and a few published notes. Littler (1910, p. 53) states it is a pest to small fruit growers when it eats fruit in season but adds that "it more than pays for the fruit taken by the quantity of blight (=aphids) destroyed during the autumn and winter months". Sharland (1981, p.141) records it as "gathering insects from rose bushes, shrubs and garden trees generally" and"also picks at over-ripe fruit". One of us (R.H.G.) has observed a flock of about 50 apparently feeding on aphids in a crop of field tunrips under heavy frost at Antill Ponds in July 1957. Green (1966) found moth larvae (Fam. Geometridae) in the gut of one collected at Antill Ponds in August, 1959 and seeds of *Rhagodia baccata* (a coastal saltbush) and *Solanum* sp (nightshade family) from the gut of another collected on King Island in February 1968. The recent establishment of vineyards in Northern Tasmania is now attracting flocks of silvereyes to feed on ripe grapes. In so doing they damage the fruit and can significantly reduce yields and financial returns.

As part of a long term fauna study by one of us in the central northern highlands (Green 1977, 1982) a series of silvereyes was taken between 1976 and 1986, in the vicinity of the QVM's Maggs Mountain Field Station (41° 41′ S, 146° 12′ E.; Alt. 850m), and the gut contents extracted and preserved in 70% alcohol.

Silvereyes are abundant on Maggs Mountain in the eight month period from September to April, moving through the sclerophyll forest in loose parties, gleaning invertebrates and fruits from amongst the foliage. They desert the area with the onset of the winter cold and are absent for the four months from May to August (Green, 1977).

From the above series, one hundred and sixty two gut samples of silvereyes have been sorted by one of us (T.J.S.) and representatives of insects determined, by another (P.B.M. Table 1). In some samples, insect remains were so finely comminuted as to be impossible to identify and generally it was possible to identify material only to family level. Whole seeds found in the gut were similarly sorted and representatives have been examined by Dr Robin Barker, Division of Wildlife and Rangelands Research, C.S.I.R.O., Canberra and Mr Dennis Morris,

Tasmanian Herbarium. These examinations and determinations have revealed that silvereyes from Maggs Mountain had been feeding primarily on insect larvae from the time of their return to the area in September until about the end of January, after which and until their departure in April they fed almost exclusively on small fruits or seeds.

The insect larvae most commonly eaten were of leaf beetles (Fam. *Chrysomelidae: Paropsinae*). These appeared in almost every sample collected in September, October and November, with up to 50 larval skins present in some samples, but were absent in samples collected in later months. Only one sample (25 November 1978) contained adults.

Larvae of chyrsomelids live commonly on eucalpyts and can seriously defoliate young trees. Paropsine larvae are generally regarded as being distasteful and/or poisonous to birds and were a suprising inclusion in the samples.

Larvae of Lepidoptera (Geometridae, Gelechioidea, Pyralidae and Lasiocampidae) occurred commonly in samples taken in October, November and December.

These groups occur commonly on exposed surfaces of eucalypt foliage but gelechioid larvae live inside silken retreats and would have had to have been extracted by the silvereyes.

About ten species of seeds were found in the samples but only one (undetermined) was present in significant numbers. It was present in samples taken in Spring and Autumn particularly in February and March when some carried fragments of fruit flesh. Seven samples (9 February 1982), contained seeds of *Acacia* sp, suggesting that odd mature seeds are ocassionally taken in addition to ripe fruits on which the flesh is the probable attraction. One sample, (18 March 1976), contained blackberry (*Rubus* sp.) seeds.

From these data the silvereye may appear to be a non-selective or opportunistic feeder, taking mostly larvae when these are abundant in Spring and early Summer and turning to fruits as these ripen in Summer and Autumn.

Alternatively it may be that a high protein (insect) diet is essential to stimulate breeding and later for the feeding and rearing of nestlings and juveniles during Spring and early Summer. The Summer and Autumn intake of ripe fruit with its sugar content would contribute to an accumulation of body fat reserves against the onset of cold winter weather and for the extra energy required for migration. Mees (1974), when discussing possible reasons for the Tasmanian silvereye being a partial migrant, (part only of the population leaves Tasmania each autumn), suggests that a combination of several factors may be necessary for migration to proceed, one of which is that the birds must be in the right physiological condition. An accumulation of fat (fuel for the journey) is part of this conditioning and only those individuals which attain suitable condition and receive the necessary stimuli are prompted to migrate. Although the composition of the silvereyes' food intake may be influenced by the availability of various items, it may be that the seasonal change from an insectivorous to frugivorous diet is an essential process in the birds' physical preparation for migration, those individuals not attaining a satisfactory level then not attempting to migrate.

Table 1. Insects from *Zosterops lateralis* gut samples.

Lepidoptera —	Geometridae — Ennominae	larva	Oct-Feb	few
	Gelechioidea	larva	Dec	few
	Pyralidae	larva	Oct-Dec	common
	Lasiocampidae	larva	Oct-Nov	rare
	Undet. Fam.	larva	Oct-Nov	few
Coleoptera —	Chrysomelidae — Paropsinae	larva	Sept-Nov	abundant
	Chrysomelidae — Paropsinae	adult	25 Nov	rare
	Chrysomelidae	adult	Jan-Feb	few
	Nitidulidae	adult	19 Oct	1 only
	Carabidae	larva	16 Dec	few
Neuroptera —	Chrysopidae	larva	16 Feb	1 only
Plecoptera? —	Undet. Fam.	adult	16 Dec	1 only

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ALBINO GREY CURRAWONG

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On October 1988 I was included in a walking party from Stormlea to Cape Raoul on Tasman Peninsula.

Just after setting out from the end of the road a large white bird was seen alighting in a eucalypt tree on the edge of a paddock about 300 metres ahead of us. My first thought was of a Sulphur-crested Cockatoo but I realised that its tail was too short for that bird and my mind then turned to a White Goshawk. That was ruled out also because the bill was straight, long and pale yellow.

Before we had been able to approach much further the bird flew off into the forest accompanied by a small party of Grey Currawongs and I was satisfied then that it was an albino of that species.

On our return about five hours later the lone white bird was seen in the same vicinity but this time it was foraging on the ground. By using available cover we were able to approach more closely and obtain a good view of it, but the bird was very shy and soon took flight joining the others of the Grey Currawong party and retiring to the forest. We did not pursue them further as we had no doubt about its identity.

This was the only party of these birds seen that day, although we did see and hear a few Black Currawongs about three kms nearer to Cape Raoul. The prominent white patches in the wings of the Grey Currawongs left us in no doubt as to their identity. However, we didn't get near enough to the white bird to see the colour of its eyes so that some doubt may be expressed as to whether it was a true albino, but the pale yellow of its bill, which normally would be black reinforces my belief that it was an albino.

An interesting comment subsequently came from a local resident who, a week after my sighting, independently described this bird and exactly where it could be found to a member of the Bird Observers' Association of Tasmania.

BOOK REVIEW

The Lyrebird — a Natural History

By Pauline Reilly. Published by NSW University Press, Sydney. RRP $14.95
Reviewed by L. E. Wall

This book is the latest in the Australian Natural History Series. It contains a good selection of photographs in black-and-white and in colour together with a number of diagrams and sketches of feathers and claws, a list of references from the literature, and an index, totalling 92 pages.

The series is intended for students and biologists at both secondary and tertiary levels as well as for readers with a serious interest in animals and the environment.

The author was closely involved for several years with the Sherbrooke Survey Group of the Bird Observers Club making a detailed study of the lyrebird and its habits just to the east of Melbourne, and has also taken note of other areas within its range. The text is carefully divided into eleven chapters, each dealing with a specific aspect of the life history, and in general terms it would be difficult to fault the contents of their presentation, but there are a couple of minor points which are worthy of comment.

On page 5, the late Tom Tregallas has been credited with the first direct broadcast of lyrebird song on radio, which indicates a broadcast from natural surroundings. There is a story behind this. It took place on 5 July 1931 from Sherbrooke Forest and was transmitted by A.B.C. stations 3 LO and 3 AR, but R. Littlejohns, another avid photographer and recorder, heard of this plan beforehand and arranged a broadcast by a commercial radio station a week earlier, using a sound film track.

On page 13 Pauline Reilly mentions that in 1987 she made a cursory examination of the soil and leaf litter in the areas where lyrebirds had been released in Tasmania years ago but could not find any prey species which would be available to the birds. She made no comment to me at the time, and I could have told her that years previously another visitor to Mt. Field National Park had pointed out to me amphipods which are one of the main food items of these birds, and they were quite common in the leaf litter under better seasonal conditions which applied then.

On page 84 the Eastern Quoll is given the local name of Tiger Cat although its common name in Tasmania is Native Cat. On page 61 the Spotted-tailed Quoll is correctly given the common name Tiger Cat.

For anyone interest in a close study of these intriguing birds this book is to be recommended.