

Action Statement

Flora and Fauna Guarantee Act 1988

No. 130

Sedge-rich *Eucalyptus camphora* Swamp

Description and Distribution

The only known occurrence of Sedge-rich *Eucalyptus camphora* Swamp is within the Yellingbo Nature Conservation Reserve, 50 km east of Melbourne in the Yarra Valley (SAC 1994). The community typically features a canopy of Mountain Swamp Gum *Eucalyptus camphora* of moderate cover (20-50%). Canopy height varies from about 6 to 25 metres (McMahon *et al.* 1991). The community varies in structure from open forest to woodland. The shrub stratum is sparse and dominated by Woolly Tea-tree *Leptospermum lanigerum*. In contrast the ground layer is comprised of a diversity of sedges, rushes, grasses and forbs. Notable species include Fen Sedge *Carex gaudichaudiana*, Tassel Sedge *Carex fascicularis*, Tall Sedge *Carex appressa*, Leafy Flat-sedge *Cyperus lucidus* and Soft Twig-sedge *Baumea rubiginosa*, Australian Gipsywort *Lycopus australis*, Ridged Knotweed *Persicaria strigosa* and Showy Willow-herb *Epilobium pallidiflorum*.

Where Sedge-rich *Eucalyptus camphora* Swamp is associated with well-defined streambeds or near permanent flowing water, Woolly Tea-tree forms a closed-shrub community with scattered emergent Mountain Swamp Gum. Scented Paperbark *Melaleuca squarrosa* is co-dominant with Woolly Tea-tree in the lower reaches of ephemeral tributaries. In these areas, Mountain Swamp Gum has a cover of 5-20%. On sites subject to seasonal rather than permanent inundation, Variable Sword-sedge *Lepidosperma laterale* var. *majus* is frequently co-dominant with sedges *Carex* spp. Blackwood *Acacia melanoxylon* and Slender Tussock-grass *Poa tenera* are also found in these sites. Where Sedge-rich *Eucalyptus camphora* Swamp has been highly disturbed, Common Reed *Phragmites australis* dominates the ground layer.

At these sites the canopy of eucalypts is very sparse or absent as a result of dieback.



**Sedge-rich *Eucalyptus camphora* Swamp
Distribution in Victoria**
[source: Flora Information System, DSE 2004a]

Current conservation status

SAC (1994).....threatened (Vic.)

Sedge-rich *Eucalyptus camphora* Swamp has been listed as a threatened community under the Flora and Fauna Guarantee Act 1988.

Reasons for conservation status

In its final recommendation (SAC 1994), the Scientific Advisory Committee determined that Sedge-rich *Eucalyptus camphora* Swamp is:

- only known from one site in Victoria
- very rare in terms of the total area it covers
- significantly prone to future threats which are likely to result in extinction of Sedge-rich *Eucalyptus camphora* Swamp
- in a demonstrable state of decline which is likely to result in extinction of Sedge-rich *Eucalyptus camphora* Swamp

Comprehensive surveys provide evidence that Sedge-rich *Eucalyptus camphora* Swamp is very rare in terms of abundance and distribution. The total area occupied by Sedge-rich *Eucalyptus camphora* Swamp is estimated to be 200ha (SAC 1994). It is likely that the Sedge-rich *Eucalyptus camphora* Swamp was once widespread in valleys between Healesville and Macclesfield but has been markedly reduced in extent through clearing (McMahon and Franklin 1993).

Major Conservation Objective

Objectives of this Action Statement

- to refine our understanding of the distribution and ecology of Sedge-rich *Eucalyptus camphora* Swamp
- to determine the nature and impact of threats affecting Sedge-rich *Eucalyptus camphora* Swamp
- to develop and implement effective management techniques.

Long-term objectives

- protect, enhance and restore the extent and quality of Sedge-rich *Eucalyptus camphora* Swamp.

Decline and Threats

Eucalypt Dieback

The community is threatened by eucalypt dieback. McMahon et al. (1991) considered that dieback could result in destruction of the eucalypt canopy. The Cockatoo Swamp supports the largest stand of this community within the reserve and McMahon and Franklin (1993) estimated that 30% of the canopy was affected by dieback. Since 1991 a further 12% of the Swamp has suffered dieback with weed species invading the understorey (Carr 1998).

Eucalypt dieback within the Yellingbo Nature Conservation Reserve represents a severe site-level response to a range of complex, interacting landscape management issues. Potential contributing factors include:

- Nutrient imbalances in trees brought about by anthropogenic input of nutrients from surrounding agricultural activities (Kasel 1999). Elsewhere, high nitrogen levels in eucalypt leaves have been shown to correlate with increased insect populations leading to eucalypt dieback (e.g. Fox and Macauley 1977, Atkinson 1990, Landsberg 1990)
- High numbers of Bell Miners *Manorina melanophrys* that aggressively exclude psyllid-eating birds leading to high numbers of sap-feeding psyllid insects (Loyn et al. 1983).

- Altered water distribution patterns in the swamp as a consequence of levee construction in the 1950s (Pearce 1997, Craigie et al. 1998);
- Sediment deposition, possibly as a consequence of point (3) above (Carr 1998, Craigie et al. 1998).

Over the last decade several hypotheses have been advanced to explain eucalypt dieback within the Yellingbo Nature Conservation Reserve. Initially dieback was attributed to exhaustion of carbohydrate reserves within the trees as a consequence of psyllid infestation maintained by Bell Miners (Menkhorst and Middleton 1999, McMahon *et al.* 1991). These authors recommended removal of Bell Miners.

Dieback in some parts of the Sedge-rich *Eucalyptus camphora* Swamp (e.g. Macclesfield Creek) may be attributed to the psyllid-Bell Miner interaction (B. Quin, pers. comm.). However, dieback in the Cockatoo Swamp is not considered to be associated with Bell Miners as large numbers of these birds have not been recorded for this area (P. Menkhorst pers. comm.).

Kasel (1999) made a thorough study of the decline of Mountain Swamp Gum within the Yellingbo Nature Conservation Reserve. She suggested that dieback along the Cockatoo Creek was related to water stress (i.e. seasonal water deficit), nitrogen-enrichment, increasing soil salinity or a combination of these factors (Kasel 1999).

Lack of eucalypt regeneration

There is little evidence of natural regeneration of Mountain Swamp Gum at Yellingbo (Pearce 1997, G. Carr *pers. comm.*). Death of adult trees coincides with changes in the understorey of Sedge-rich *Eucalyptus camphora* Swamp (Carr 1998). Pearce (1997) considers that the development of replacement stands of Mountain Swamp Gum is of paramount importance for the conservation of the endangered Helmeted Honeyeater *Lichenostomus melanops cassidix*. Lack of suitable sites for establishment, grazing from native and feral vertebrates and competition from native (e.g. Common Reed) and exotic plant species are all likely to play a role in the failure of Mountain Swamp Gum to re-establish within the Yellingbo Nature Conservation Park – but perhaps the most basic determinant of all these ecological changes, including the death of dominants and the inability of *Eucalyptus camphora* to regenerate, is anthropogenic nutrient enrichment, particularly nitrification.

The potential for the introduced Honeybee *Apis mellifera* to alter pollination patterns from outbreeding to inbreeding and thus the genetic quality and absolute quantity of Mountain Swamp

Gum seed should not be discounted (Paton 1993, Horskins and Turner 1999).

Weeds

Thirty one percent of plant species represented in the Yellingbo Nature Conservation Reserve are naturalised aliens with the potential to seriously degrade or even eliminate the indigenous vegetation of the reserve (McMahon *et al.* 1991). This relatively high composition of weeds is probably a consequence of the linear nature of the Reserve and a history of considerable site modification, including eutrophication (nitrification). Weed species comprise about 15% of total plant species of the Sedge-rich *Eucalyptus camphora* Swamp. The main weed species of concern to Sedge-rich *Eucalyptus camphora* Swamp are Grey Sallow *Salix cinerea*, Great Reed-mace *Typha latifolia*, Reed Canary-grass *Phalaris arundinacea*, Reed Sweet Grass *Glyceria maxima*, Creeping Buttercup *Ranunculus repens*, Lesser Spearwort *Ranunculus flammula* and Cut-grass *Leersia oryzoides* (McMahon *et al.* 1991, Carr 1998, G. Carr *pers. comm.*).

Wider conservation issues

The Helmeted Honeyeater and the Leadbeater's Possum *Gymnobelideus leadbeateri*, are found within the Sedge-rich *Eucalyptus camphora* Swamp and are taxa listed under the **Flora and Fauna** Guarantee Act 1988. The only known breeding territories of the Helmeted Honeyeater occur within Sedge-rich *Eucalyptus camphora* Swamp, and a recovery plan has been in place for this species since 1989 (Menkhorst and Middleton 1991, Menkhorst *et al.* 1999). The endangered Lewin's Rail *Rallus pectoralis* and the vulnerable Swamp Skink *Egernia coventryi* have been recorded within Sedge-rich *Eucalyptus camphora* Swamp. Other significant records include a large breeding population of Southern Emu-wren *Stipiturus malachurus* and breeding records of the uncommon Spotless Crane *Porzana tabuensis* (DSE 2004b). The conservation of the Sedge-rich *Eucalyptus camphora* Swamp has the potential to significantly contribute to the conservation of these other taxa.

Previous Management Action

The Yellingbo State Nature Reserve was gazetted in 1965 under the Land Act 1958 following community concern over declining numbers of the Helmeted Honeyeater. Further areas were obtained through land purchase and donations. The Yellingbo Nature Conservation Reserve, as it is now called, has more than tripled in size to 591ha (Parks Victoria 2000).

Survey

The vegetation of the Reserve was surveyed by McMahon *et al.* (1991). Carr (1998) made a brief study of the Mountain Swamp Gum dieback. Craigie *et al.* (1998) assessed proposed works to ameliorate the effects of hydrological processes on vegetation dieback at Cockatoo Swamp. Some mapping of dieback in relation to sediment depth is on-going (B. Quin *pers. comm.*)

Research

There has been no formal research into the vegetation community dynamics (e.g. vegetation change over time, recruitment processes etc.) of the Sedge-rich *Eucalyptus camphora* Swamp.

Site Management

Management of the Sedge-rich *Eucalyptus camphora* Swamp has included weed removal and coppice treatments of some trees and shrubs (B. Quin, J. Bye *pers. comm.*). Between 1978 and 1987 approximately 80 000 trees and some shrubs were planted in the Yellingbo Nature Conservation Reserve (Backhouse 1987). Planting continued through the following decade, with rehabilitation efforts receiving a boost recently from 'Green Corps' teams. In the last few years, approximately 10 000 seedlings of 15 tree and shrub species have been planted per year. Some fencing has been undertaken to protect plants from grazing (J. Bye *pers. comm.*). However, virtually no planting occurred in the Sedge-rich *Eucalyptus camphora* Swamp due to the seasonally flooded conditions (P. Menkhorst *pers. comm.*). Nevertheless this revegetation is likely to provide an important ecological buffer to the threatened community.

Earlier this year, following a recommendation of Craigie *et al.* (1998), a new levee was created to re-engage the natural floodplain.

Monitoring

A monitoring program was started in 1998 using photo-points to track:

- Common Reed invasion of areas in Cockatoo Swamp formerly dominated by Woolly Tea-tree which had succumbed to dieback;
- epicormic growth of Mountain Swamp Gum and coppiced trees and shrubs in Cockatoo Swamp and Macclesfield Creek (B. Quin *pers. comm.*).

Intended Management Action

The conservation program for the Sedge-rich *Eucalyptus camphora* Swamp will be most effective if its implementation is integrated with management of Helmeted Honeyeater. The importance of Mountain Swamp Gum Woodlands for Helmeted Honeyeater conservation is well known (Menkhorst and Middleton 1991, McMahon

and Franklin 1993, Pearce et al. 1994, Moysey 1997). The Helmeted Honeyeater Recovery Plan 1999-2003 (Menkhorst et al. 1999) lists several objectives of direct relevance to the conservation and management of the Sedge-rich *Eucalyptus camphora* Swamp. These are:

Objective 3.2: Review and update the revegetation strategy (McMahon and Carr 1992) for Yellingbo Nature Conservation Reserve then expedite its implementation. Experiment with locally untried revegetation techniques.

Objective 3.4: Continue to investigate the causes of eucalypt dieback throughout Yellingbo Nature Conservation Reserve. Develop a protocol for monitoring vegetation succession in dieback-affected areas.

Objective 3.8: Actively encourage research into the ecology of the *Eucalyptus camphora* communities at Yellingbo, particularly mechanisms for population recruitment.

These objectives have been incorporated into the intended management actions for the Sedge-rich *Eucalyptus camphora* Swamp listed below.

Site Management

1. Intensify weed control activities within the Yellingbo Nature Conservation Reserve, with a view to maintaining currently weed-free or lightly-infested areas and restricting spread from currently heavily-infested areas.

Responsibility: Parks Victoria

2. Instigate a field trial program for Mountain Swamp Gum regeneration based on the suggestions of Pearce (1997).

Responsibility: Parks Victoria

Survey

3. Investigate possible occurrence of similar vegetation in and downstream of Bunyip State Park along sections of Diamond Creek, Back Creek (sometimes called Black Snake Creek) and the Bunyip River.

Responsibility: Parks Victoria, Helmeted Honeyeater Recovery Team

4. Review and refine if necessary Sedge-rich *Eucalyptus camphora* Swamp's characterisation and accurately map its distribution and condition.

Responsibility: Parks Victoria, DSE (Biodiversity & Natural Resources Division)

Monitoring

5. Monitor the physical and biological responses of the Sedge-rich *Eucalyptus camphora* Swamp in Cockatoo Swamp to the recent hydrological works (new levee creation). Physical aspects

may include sediment levels and water distribution patterns. Chemical monitoring should include some measure of soil eutrophication, notably ammonium, nitrate and phosphate. Biological factors could encompass tree and shrub health (specifically recovery from dieback), floristic responses (including those of weeds) and re-colonisation by Helmeted Honeyeaters and Leadbeater's Possum.

Responsibility: Parks Victoria, Helmeted Honeyeater Recovery Team

6. Maintain the existing photo-point monitoring program.

Responsibility: Parks Victoria

7. Monitor the survival and health, including growth, of any plantings in the Sedge-rich *Eucalyptus camphora* Swamp.

Responsibility: Parks Victoria

Research

8. Continue to investigate the causes of eucalypt dieback throughout Yellingbo Nature Conservation Reserve (Menkhorst and Middleton 1991, Scroggie and Wright 1998, Menkhorst *et al.* 1999). Include, as part of this study, an investigation of land use patterns in the catchment over the last 40 years (Nathan 1995) and study of plant nutrient accretion (particularly nitrogen & protein concentrations in foliage).

Responsibility: Parks Victoria, Helmeted Honeyeater Recovery Team

9. Investigate the potential of vegetated buffer strips at the margin of the riparian zone to reduce the input of nitrogen into the streams supporting the Sedge-rich *Eucalyptus camphora* Swamp (Kasel 1999).

Responsibility: Parks Victoria

Catchment Management

10. Identify point sources of nutrients upstream of Yellingbo Nature Conservation Reserve (Kasel 1999).

Responsibility: DSE (Port Phillip Region), Port Phillip Catchment and Land Protection Board, Parks Victoria

11. Encourage adjacent landholders not to line drains close to the reserve with crushed rock "...as this reduces the capacity for nutrient retention within the stream channel via increased flow and reduced opportunity for biological and chemical interactions" (Kasel 1999: 315).

Responsibility: DSE (Port Phillip Region), Port Phillip Catchment and Land Protection Board, Parks Victoria

12. Liaise with local and state government regulatory authorities to modify water diversion practices upstream of the Reserve (Kasel 1999).

Responsibility: DSE (Port Phillip Region), Port Phillip Catchment and Land Protection Board, Parks Victoria

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Compiled by Vivienne Turner, Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment.

Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

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