

Action Statement

Flora and Fauna Guarantee Act 1988

No. 133

Swamp Sheoke *Casuarina obesa*

Description and Distribution

Swamp Sheoke *Casuarina obesa* (Miq.) is a rounded tree 6-14m high, with narrow grey-green branchlets to 210mm which droop at the ends. The bark is hard, greyish and has a tessellated appearance. The dull-green branchlets have flat ridges and are up to 1.5mm thick. The small erect leaf-teeth are slender and occur in whorls of 12-16. Cylindrical female cones (10-20mm long) and male flower spikes (10-30mm long) occur on separate trees (Walsh & Entwisle 1996). Specimens from the Wimmera populations show extreme variability, with branchlets up to 1m long and commonly 600 to 700mm, the leaf teeth in whorls of up to 30 with the male flower spikes to 550mm and cones 18mm x 25mm. The bark and growth habit are also extremely variable (Jessop & Toelken 1986, Venn *pers. comm.*, Walsh & Entwisle 1996).

Swamp Sheoke often occupies distinctive niches: low lying seasonal swampy flats only just above high water level; limits along river banks only 20-40m wide and, inland, on the edge of salt lakes. In these latter areas it may grow as pure, dense thickets or as the principal large shrub or small tree with other trees (Midgley *et al.* 1981). The area in Western Australia where Swamp Sheoke grows consists mainly of plains and gently undulating topography.

The soils include a wide range of sands and silts. Other types that have been recorded include pink granitic sands, stony red soils, red clay loams and swampy soils (Midgley *et al.* 1981).



Swamp Sheoke *Casuarina obesa*
(Photos: David Parkes)



Distribution in Victoria
(source: Flora Information System, DSE 2004a)

The species occurs predominantly in south-west Western Australia from the Murchison River to east of Esperance, and from near Perth to Kalgoorlie (Midgley *et. al.* 1981). It is quite common on the west coast and inland but is very rare in the eastern states. The only locality known in south-western New South Wales at Lake Benanee near Euston is still extant (Walsh *pers. comm.*). In Victoria, only nine extant natural populations are known: one at Karadoc Swamp in north-west Victoria, and the other eight in the Wimmera, near Horsham. The total number of plants known in Victoria is approximately 4 000. Populations range in size from a couple of individuals to thousands of plants. The larger populations which comprise greater than 60% of individuals are unisexual and occur on private land. No populations occur on conservation reserves.

Current Conservation Status

DSE (2004b) endangered

SAC (1991) threatened

Swamp Sheoke is listed as a threatened species under the **Flora and Fauna Guarantee Act 1988**. The species was previously recorded from only two sites in Victoria at Karadoc Swamp and south-west of Mt Arapiles in the Wimmera. Swamp Sheoke was also known from a number of other sites in the Wimmera and near Nhill and Dimboola. These populations are now extinct.

Surveys in the Wimmera area have located a further six sites. However, Swamp Sheoke has declined considerably through clearing of native vegetation, grazing by stock and feral animals and rising ground water levels resulting in salinity problems.

The populations in the Wimmera occur in areas where grazing and cropping occur. At the Karadoc Swamp site 95% of the original population has died in the past decade due to the combined effects of salinity, waterlogging by groundwater and altered hydrology regimes, due to river regulation (Parsons *pers. comm.*). The current management of Karadoc swamp is not sympathetic for the conservation of Swamp Sheoke.

No known populations of Swamp Sheoke occur on land specifically reserved for conservation. Five of the sites occur on freehold land including the largest populations with the remaining four sites on road reserve.

In its final recommendation the Scientific Advisory Committee (SAC 1991) has determined that the Swamp Sheoke is:

- in a demonstrable state of decline which is likely to result in extinction;

- significantly prone to future threats which are likely to result in extinction;
- very rare in terms of abundance or distribution;
- threatened because the reproduction or recruitment of the taxon has seriously declined or is not occurring.

Major Conservation Objectives

Objective of this Action Statement

To arrest the decline of Swamp Sheoke by:

- protecting existing populations from threatening processes and encouraging natural regeneration and expansion.
- preserve the gene pool of the species at Karadoc Swamp and Wimmera sites either on site or using *ex situ* conservation methods.

Long-term objective

To ensure that Swamp Sheoke survives, flourishes and retains its potential for evolutionary development in the wild by:

- ensuring that single sex sites in the Wimmera contain at least 100 plants of the opposite sex by 2010.
- creating five new sites of 100 plants of each sex in the wild on secure public land within the known Victorian range by 2020.

Management Issues

Very little is known about the ecology and biology of the Swamp Sheoke. Swamp Sheoke is known to grow naturally on salt-affected soil in Western Australia. The species occurs naturally in areas which are seasonally waterlogged as well as in saline areas (Van der Moezel *et. al.* 1989). In Western Australia Swamp Sheoke can occur in lakes where trees may be inundated for up to 60% of the year (Froend *et. al.* 1987).

In Victoria, the species occurs in local depressions and in areas where water may be more readily available. At the Karadoc swamp site, increasing salinity levels will almost certainly see the demise of the species.

The species has been shown to produce aerenchymous root tissue after exposure to waterlogged conditions (Van der Moezel *et al.* 1988). The role of aerenchyma is considered to be as a pathway for the transport of oxygen into the roots and toxic gases out of the roots (Crawford 1983).

Reproduction

Lack of regeneration by sexual means and limited asexual regeneration is a major issue for the species survival in Victoria. Regeneration is

possible from seed or suckering. There appears to be little or no viable seed produced from any of the populations presumably due to the poor health of the trees and separation of the sexes at some sites. The larger populations in the Wimmera consist of two apparently unisexual stands of the opposite sex, separated by approximately 4.5km, sexual reproduction is therefore severely limited.

Various other factors apart from seed viability could be responsible for the lack of seedling regeneration. Such factors could include pH, salinity, water logging and nutrient deficiencies.

Introduced plants occur at all sites and have the potential to inhibit seedling growth if viable seeds were produced and subsequently germinated. *Ex situ* conservation offers a means of maintaining the genetic diversity of the species. Complications have been experienced by researchers in the successful propagation of Swamp Sheoke. Various methods of propagation, including, cuttings, potting of suckers and tissue culture have met with limited success. Recent work has shown the propagation of root suckers to be successful and feasible. However, to maintain genetic diversity, propagation from seed needs to be explored.

Swamp Sheoke is not regenerating from seed at any of the nine sites. Although suckers are present at six of the nine known sites, it appears no viable seed is being produced (Venn *pers. comm.*). Possible germination of seed may have occurred at Site 5 (Ailsa) but there is little chance of regeneration there under current conditions.

Land Tenure

Swamp Sheoke currently occurs on land not specifically reserved for conservation. Five sites (1,

2, 3, 8 and 9) occur on private property. The two sites at Jilpanger offer the greatest opportunity for conservation, primarily because of the large number of trees present and the potential for future regeneration on site. Three sites appear relatively secure on road reserves and offer opportunity for seed collection and propagating. Regeneration on site will be minimal due the nature of the reserve and future road maintenance. One site occurs on a Water Supply Reserve, and similarly to those on road reserves, offers minimal opportunity for future spread. Karadoc swamp (site 9) on private property has become unsuitable for *C. obesa*.

Grazing

The majority of sites (1, 2, 3, 4, 6 and 8) are grazed by stock, feral and native animals. Potentially grazing causes ground compaction, increases soil nutrients, introduces weed species and causes damage to resident native trees and seedlings. The palatability of Casuarinas generally, is high (Cunningham *et al.* 1992) and it is likely that seedlings of *C. obesa* would be grazed extensively by stock. To further compound the problem, cropping and cultivation occurs at these sites and/or adjacent to them. Cropping and cultivation may alter soil nutrition and moisture levels, which could affect the remaining trees and their prospects of regeneration.

Weeds

In disturbed systems weed species have the potential to reduce native regeneration. At one site Horehound *Marrubium vulgare* has become widespread and may be limiting native regeneration.

Table 1: Sites of Swamp Sheoke in Victoria (M = male, F = female)

Site	Number of trees	Area (ha)	Sex	Land Tenure	Threats
1	1 000s	1.5	M	private	grazing/clearing
2	1 000s	60	F	private	grazing/clearing
3	12	8	mixed	private	grazing/clearing
4	2		mixed	road reserve	grazing/fire protection works
5	100	>1	M	water supply purpose	clearing for road channel maintenance
6	25		?	unused road	grazing/clearing
7	200+		mixed	road reserve	grazing/road maintenance
8	1		?	private	grazing/clearing
9	500+		mixed	private	salinity

Wider conservation issues

Conserving the population of Swamp Sheoke will not only maintain this species in Victoria, it will provide a refuge of genetic material for the species as a whole. It provides an opportunity to develop and refine techniques relevant to the conservation of woody species at risk, particularly those which reproduce by seed only rarely. The high conservation significance of these woodland types is becoming increasingly recognised. The extensive past clearing and persistent grazing of these woodlands enhances their need for conservation.

Rises in salinity levels are increasingly recognised as a threatening process. Even species capable of tolerating higher salt levels are not coping with significant changes in salinity levels. Implementation of the Nangiloc-Colignan Salinity Management Plan should take into account the requirements of this species.

Previous Management Action

Site 9 Karadoc Swamp

An area of 1 000m x 100m was fenced, to prevent the grazing of suckers by introduced animals. Tree planting has also occurred in an attempt to reduce groundwater levels throughout the fenced area. Germination trials have been undertaken with no success. The potting of suckers occurred with limited success.

Ripping was undertaken to increase the amount of root sucker regeneration. Bores have been installed to monitor groundwater levels.

In a co-operative approach between the then Flora, Fauna and Fisheries and Catchment and Land Management Divisions, two local native nurseries were engaged in late 1995 to trial different methods of propagation. A total of 30 specimens were propagated from root suckers with a leaf area reduced by 30% and treated with rooting hormone. Eleven of these suckers have been planted off site, under drip irrigation with appropriate tree guards to provide a population from which viable seed may be obtainable in the future.

Wimmera Populations

Several of the Wimmera populations were discovered as recently as 1994 and minimal management has therefore occurred to date. Specimens from each site have been collected and sent to the National Herbarium of Victoria. Soil samples and fresh specimens were collected from each site and sent to Dr Brett Summerell, Royal Botanic Gardens NSW to determine if the variations between sites were a result of microbial activity.

A Conservation Covenant has been placed over the largest of the sites, site two at Jilpanger. In addition some strategic fencing and weed control has occurred. This has been undertaken by the landowners with advice from NRE. NRE has liaised with landholders to explain the importance of the species. Local authorities including VicRoads, Country Fire Authority and Water Authority have also been notified of the occurrence, significance and appropriate management of Swamp Sheoke.

Intended Management Action

Monitoring

1. Monitor Swamp Sheoke populations annually using DSE's VROTPop database or compatible system. Monitor specifically for seed and seedling development.

Responsibility: DSE (SW & NW Regions)

Research

2. Encourage, facilitate and support research into Swamp Sheoke, including
 - responses to different salinity levels, flooding regimes, longevity, germination of seeds and preferred habitat characteristics.
 - historical distribution, based on maps, Landsat imagery and aerial photos to establish the original distribution of Swamp Sheoke and to identify other suitable areas for establishment of new populations.

Responsibility: NRE (Biodiversity & Natural Resources Division)

Seed collection, propagation and planting

3. Continue to investigate ways of propagating the species and achieving viable seed collection. Ensure collection and propagation of seed occurs from all sites. When a cost effective method of propagation is achieved, identify at least 5 sites on public land in the known range of Swamp Sheoke where planting could occur. When sites have been selected, establish plantings at those sites.

Responsibility: DSE (SW & NW Regions)

Community education

4. Undertake community liaison concerning the ecology and management of Swamp Sheoke through press releases, information leaflets and personal contact to:
 - encourage strategic local plantings of Swamp Sheoke on public and freehold and
 - encourage scientists and researchers to monitor and evaluate management activities.

- increase awareness of Swamp Sheoke on freehold land with regard to salinity and conservation significance.

Responsibility: DSE (SW & NW Regions)

5. Liaise with VicRoads, Country Fire Authority (CFA), Water Authority and local Shires and Councils to ensure that any works do not have a detrimental effect on any of the Swamp Sheoke populations.

Responsibility: DSE (SW & NW Regions)

Fencing

6. Fence populations on all sites where grazing is considered a threat, with the consent of the land owner or managing authority,. Funding for fencing projects on private land will be sought from appropriate funding programs, such as Landcare.

Responsibility: DSE (SW & NW Regions), Mallee and Wimmera Catchment Management Authorities, landholders, land managers

Control and eradication of pest plants and animals

7. Control introduced plants and animals and reduce their threats wherever possible. Techniques which have the least impact on the populations will be used. Species to be targeted include horehound and rabbits.

Responsibility: DSE (SW & NW Regions), landholders, land managers

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

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: <http://www.dse.vic.gov.au>

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