

Wildlife Trade Operation - Harvest of *Dicksonia antarctica* (Soft tree fern) and *Cyathea australis* (Rough tree fern) from private land in Victoria

1. Introduction

This application seeks approval for a Wildlife Trade Operation under the category 'Small scale operation'. There are two components to this operation:

- Ongoing wild harvest operation. Radiata pine plantations are being harvested on private property and the applicant will be collecting the tree ferns prior to the tree harvest. The applicant also plans to collect tree ferns from private land with a DSE approved property management plan.
- Lifting of stock-on-hand from fern plantation. Since 1996, *Dicksonia* and *Cyathea* species have been legally harvested from privately owned sites and re-planted and grown in a fern plantation at the nursery property in Victoria.

1.1 Scientific name(s):

Dicksonia antarctica

Cyathea australis

1.2 Common name(s):

Soft tree fern

Rough tree fern

1.3 Location of harvest

Otway District, Colac Otway Shire, South West Victoria (privately owned).

1.4 Description of what was harvested

Whole live plants of assorted sizes for sale in the nursery trade.

1.5 Status of species under legislation

Victorian legislation

Dicksonia antarctica and *Cyathea australis* are protected under the *Victorian Flora and Fauna Guarantee Act 1988* which is administered by the Department of Environment, Land, Water and Planning (DELWP). Harvesters require a Permit to Harvest under this Act and must comply with the conditions specified on the permit. This includes local government controls under the *Planning and Environment Act 1987*, DELWP initiatives such as Code of Forest Practice for Timber Production Revision No.2 and the DELWP Victorian Tree Fern

Management Plan. Permits to harvest *Dicksonia antarctica* and *Cyathea australis* are issued by the Department of Environment, Land, Water and Planning (DELWP).

Federal

The commercial export of harvested *Dicksonia antarctica* and *Cyathea australis* is regulated under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Permits are required, and plants must be sourced from an approved harvest operation.

Cyathea australis is also CITES listed, providing protection through regulation of international trade.

2. Statement of General Goals/Aims

To provide the nursery and landscaping industry with a sustainable and legitimate source of *Dicksonia antarctica* and *Cyathea australis*.

3. Description of Management Measures

Permits to harvest the tree ferns are issued by DELWP. The properties are inspected before and after the harvesting operations by state authorities and by landholders. Harvesting is overseen by the landholders. As mentioned above, harvesting is controlled by Victorian legislation.

In relation to the ferns grown in the plantation at the nursery, the applicant has a current planning permit for the property from the Colac Otway Shire that states the use of the land is for tree fern production.

3.1 Details of harvest area

The harvest will be restricted to tree ferns (*Dicksonia antarctica* and *Cyathea australis*) from private property from the Otway District in the Colac Otway Shire in South West Victoria. The current harvest site is a previously cleared farm that has been planted with radiata pine.

The fern plantation stock is located on private property in the Otway Ranges, Victoria.

3.2 Details of land ownership

Private property.

3.3 Harvest quantity

The maximum number of *Dicksonia antarctica* and *Cyathea australis* plants which may be harvested from the wild is limited to the number specified on the permits issued by the Victorian Department of Environment, Land, Water and Planning.

3.4 Method of harvest and equipment

Tree ferns are harvested selectively using chainsaws and tractors. The method employed has been proven to be successful in ensuring the survival of the harvested plant without detrimental impacts on the local environment.

3.5 Timing and duration of harvest

The fern harvest is prior to the harvesting of the trees in the pine plantation.

Lifting stock from the fern plantation may be conducted at any time of the year.

4. Impact of harvest on Taxa and Relevant Ecosystem

The harvest of the tree ferns from the pine plantations is unlikely to have a significant impact on either the taxa or relevant ecosystem as it is a small-scale harvest prior to timber harvesting.

The lifting of the plantation tree fern stock is unlikely to have an impact on either the taxa or relevant ecosystem in this situation as the area concerned was a commercial potato and beef farm prior to being planted with tree ferns and it is a small-scale operation. The growing of tree ferns has resulted in the cleared paddock regenerating trees, building topsoil, in some areas establishing an understory of sphagnum moss and has created natural habitat for many native animals. As the area is only selectively lifted, habitat remains constant on a farm surrounded by clearfelling operations on neighbouring properties. The tree fern farming system has had positive impacts on the environment and sustainability.

5. Monitoring and Assessment

5.1 Resource assessment

Assessments of tree fern distribution have been conducted and *Dicksonia antarctica* and *Cyathea australis* are found to be common in the region of interest (Duncan and Isaac 1984; Gullen and Walsh 1985).

5.2 Independent supervision

Independent supervision of the wild harvest is provided by the landowner and DEWLP.

5.3 Monitoring of harvesting

Monitoring of the ecosystem and the effect of harvesting is assessed by the applicant, DWELP and landowner.

Monitoring of the ecosystem and the effect of harvesting the plantation tree ferns is assessed visually by the applicant. The applicants are familiar with the key components of environmental management systems for horticulture and natural resource utilization. Action will be taken should any unforeseen effect arise.

6. Management strategies

The ongoing wild harvest is primarily salvage harvest of tree ferns from pine plantations prior to harvest of the pines. As the intention of salvage harvest is to harvest ferns that would otherwise be destroyed in other land use activities, no ongoing management is required.

Tree fern production is the primary focus of the tree fern plantation into which the wild-harvested ferns are replanted. As it is not a naturally occurring population of tree ferns management strategies and objectives for the fern plantation differ considerably to strategies designed for wild harvesting of tree ferns. On-going management strategies in the fern plantation include design, site preparation, planting, maintenance, care of stock on hand, fertilising and selectively lifting of specimens.

7. Compliance

The DELWP officer and landowner oversee compliance.

8. Reports

Reports can be made available complying with any requirements requested from the Federal Department of the Environment..

9. Background Information

Biology of Species

Dicksonia antarctica Labill (Soft tree fern)

Classification:

Division – Pteridophyta
 Class – Pteropsida (also known as Filicopsida)
 Order – Filicales
 Family – Dicksoniaceae
 Genus – *Dicksonia*
 Species – *antarctica*

(Duncan and Isaac, 1986:9)

This genus was named by L'Heritier after the Scottish botanist with a passion for non-flowering plants, James Dickson. There are around twenty species of the genus *Dicksonia* around the world. The most commonly traded is *Dicksonia sellowiana* from Brazil. There are six species of *Dicksonia* in Australasia, with two in Australia and four in New Zealand. The Australian species are *Dicksonia antarctica* from the south-east coast of Australia and *Dicksonia youngiae* from Queensland. The New Zealand species are *Dicksonia squarrosa*, *Dicksonia fibrosa* and *Dicksonia lanata*. A fourth species in New Zealand, *Dicksonia hispida* has recently been formally recognised as a different species to *Dicksonia lanata*.

Morphology

Dicksonia antarctica is a tree fern with a stout, sometimes curved, trunk up to 5x0.7m, covered by masses of brown, aerial roots. The fronds, forming a dense crown at the trunk apex, are lanceolate, to 3x1m. Fronds: Tripinnate. Fertile and sterile pinnules dissimilar. Sterile pinnules sessile, oblong to 8x4 mm, glabrous or with a few crooked hairs along

midvein of lower surface; margins toothed. Fertile pinnules of similar dimensions but with markedly recurved margins. Rhachises brown to green, those on upper parts of frond with thin line of hairs. Stipe glabrous but covered with a mat of fine, glossy, copper-coloured hairs at the base, persistent bases fragile and apparent only on the upper trunk. Sori: Spherical, about 1mm diam., marginal, initially protected by a recurved marginal flap which joins to a cupped indusium. Sporangia brown (Gullen and Walsh 1985). *Dicksonia antarctica* is found in montane forest, subalpine riparian scrub, cool temperate rainforest, wet sclerophyll forest and in radiata pine plantations.

Physiology

Austral Ecology

Volume 27 Issue 4 Page 360 - June 2002

doi:10.1046/j.1442-9993.2002.01190.x

Ecophysiology of the Soft Tree Fern, *Dicksonia antarctica* Labill

M. A. Hunt, N. J. Davidson^{1,3*}, G. L. Unwin^{2,3†} and D. C. Close³

Abstract Environmental constraints on gas exchange, stomatal conductance and water relations were investigated in the Soft Tree Fern, *Dicksonia antarctica*, at sites across its natural distribution and in the glasshouse. *Dicksonia antarctica* exhibited strong stomatal response down to a vapour pressure deficit (VPD) of 0.25 kPa, an unusual characteristic when compared with other ground fern species. Net photosynthetic rate may be a response of the microenvironment prevalent during frond development, reflecting acclimatory capacity. Both these ecophysiological characteristics are consistent with the ecological niche of *D. antarctica*, a long-lived, fire-resistant species that, during its lifetime, may be exposed to: (i) a humid environment beneath a rainforest canopy; and (ii) an exposed environment following wildfire. Maximum net photosynthesis and quantum yield of photosynthesis correlated strongly with VPD and the maximum net photosynthetic rate of $10.8 \mu\text{mol m}^{-2} \text{s}^{-1}$ was the highest yet recorded for a fern. These observations are consistent with the relatively low growth typically observed in *D. antarctica* on sunny, exposed sites and vice versa on cool, humid sites exposed to sunflecks. Favourable water relations maintained under conditions of moderate VPD (2.03 kPa) were probably due to stomatal control. However, inadequate rainfall or high VPD (4.98 kPa) caused water stress, recovery of which was limited by slow water transport through fronds. These observations are consistent with the limitation of *D. antarctica* distribution to sites sheltered from hot winds and with reliable water supply. The funnel-shaped rosette of fronds of *D. antarctica* may harvest rainfall and make it accessible to aerial roots situated at the base of fronds. This process may maintain favourable water relations independently of a subterranean root system. This proposed strategy of water acquisition is unique for a fern species and may eliminate a need for soil moisture competition with surrounding plant species. It is suggested that the ecophysiological characteristics observed in *D. antarctica* in this study may contribute to the ecological niche it occupies, which is characterized by a variable environment.

Biology of Species

Cyathea australis J E Smith (Rough tree fern)

Classification:

Division – Pteridophyta

Class – Pteropsida (also known as Filicopsida)

Order – Filicales

Family – Cyatheaceae

Genus – *Cyathea*

(Duncan and Isaac, 1986:9)

The genus *Cyathea* is further classified in a number of different ways. The most common is based on the distinctive scales at the base of the stipe that are either flabelloid or setiferous (Holtum 1964, Tyron 1970).

Subgenus *Cyathea* :

Holtum classification system - *Cyathea australis* (R Br.) Domin

Tyron classification system – *Alsophila australis* R. Br.

Cyathea is a large genus with estimates ranging from more than 600 species to more than 750 species of tree ferns, widely distributed throughout the world (Rickard 2000, Duncan and Isaac 1986). The name *Cyathea* comes from the Greek word 'kuathos', a cup, referring to the cup-like indusium found in some species. There are eleven species of *Cyathea* found in Australia while four of those are found in Victoria with *Cyathea australis* the most common and wide-spread; *C.cunninghamii* and *C. x marcenscens* are found together in southern regions while *Cyathea leichhardtiana* is restricted to the east of the state.

In the US, there has been confusion between the *Cyathea australis* and *Cyathea cooperi* with the majority of tree ferns traded in the US *Cyathea cooperi* even though they were labelled *Cyathea australis*. Correct identification of *C.australis* and *C.cooperi* in the US is being addressed with the publication of fern books by US authors, Barbara Joe Hoshizaki, John Mickel and Sue Olsen.

Morphology

Cyathea australis is a tree-fern with a trunk to 10m x 30cm, covered by persistent stipe bases of fallen fronds. The fronds which form a crown at the trunk apex, are oblong to lanceolate, to 3.5 x 1m. Fronds tripinnate. Fertile and sterile pinnules similar, sessile oblong, to 18 x 5mm, glabrous or with a few scales or hairs on midvein of lower surface; margins with shallow lobes. Rhachises brown to green, glabrous but becoming rough towards base. Stipe brown, hard, densely covered with sharply pointed tubercles and, at the base, with narrow, brown scales 1-3cm long. Sori round, about 1mm diam., non-marginal, indusium absent. Sporangia rusty brown (Gullen and Walsh 1985)

Physiology

Cyathea australis is one of our tallest and most common tree ferns. The applicant does not have access to specific physiological studies on *Cyathea australis*. Experience has demonstrated that *Cyathea australis* is adaptable to a variety of soils and climates. In temperate climates this tree fern will tolerate considerable exposure to sun. Garrett (1996) notes *Cyathea australis* has a higher light requirement than *Dicksonia antarctica* and although the two species frequently grow together, *Cyathea australis* usually occurs on higher, drier slopes. The species has been observed germinating from spores on disturbed but sheltered moist clayey soils that receive ample light. *Cyathea australis* requires more care during the transplanting and re-establishment phase than *Dicksonia antarctica*. According to Garrett

(1996) a more detailed account of the ecology of *Cyathea australis* can be found in Neyland (1986). *Cyathea australis* can be found in cool temperate rainforest, wet sclerophyll forests, riparian forest, damp sclerophyll forests and pine plantations.

9. Summary

Dicksonia antarctica and *Cyathea australis* are protected by state and federal legislation. They are permitted to be exported under an approved Program such as the Wildlife Trade Operation under section 303FN of the *Environment Protection Biodiversity Conservation Act 1999*. Both varieties are very well represented in reserves and considered to be abundant.

10. References

- Department of Natural Resources and Environment (DNRE), 2002, *Victorian Tree-Fern Management Plan*.
- Duncan, B.D. and Isaac, G., 1986, *Ferns and Allied Plants of Victoria, Tasmania and South Australia*, Melbourne University Press, Victoria.
- Olsen, Sue, 2007, *Encyclopedia of Garden Ferns*, Timber Press Inc, Oregon USA
- Garrett, M. (1996) *The ferns of Tasmania. their ecology and distribution*, Tasmanian Forest Research Council Inc, Hobart.
- Gullen, P. and Walsh, N., 1985, *Ferns and Fern Allies of the Upper Yarra Valley and Dandenong Ranges*, National Herbarium of Victoria and Department of Conservation Forests and Lands, Victoria.
- Hunt, MA, Davidson, NJ, Unwin, GL, Close, DC, 'Ecophysiology of the Soft Tree Fern, *Dicksonia antarctica* Labill', *Austral Ecology*, **27** (4) 360-368 (2002) [A1]
- Jones, D.L., 1987, *Encyclopaedia of Ferns*, Lothian Publishing Co., Port Melbourne.
- Mickel, John T, 2003, *Ferns for American Gardens*, Timber Press, Oregon USA
- Neagle, N, *Management of the Yacca Harvesting Industry on Kangaroo Island*, South Australia, March 2004
- Neyland, M.G. (1986) *Conservation and Management of Tree Ferns in Tasmania*. Wildlife Division Technical Report 86/1. National Parks and Wildlife Service Tasmania in Garrett, M. (1996) *The ferns of Tasmania. their ecology and distribution*, Tasmanian Forest Research Council Inc, Hobart.
- Rickard, M., 2000, *The Plantfinder's Guide to Garden Ferns*, Timber Press Inc, USA
- Unwin, G.L., and Hunt, M.A. (1996). Conservation and management of soft tree fern *Dicksonia antarctica* in relation to commercial forestry and horticulture. In 'Pteridology in Perspective' (Eds J.M. Camus, M. Gibby and R.J. Johns).

pp. 125-137. (Royal Botanic Gardens, Kew : London.)