Victorian Tree-Fern Management Plan

State Government Victoria
Department of Natural Resources and Environment

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December 2001

Department of Natural Resources and Environment

Compiled by Hugh Bramwells, NRE.

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Glossary

Biodiversity	the variety of all life forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part.
Bioregions	biogeographic areas that capture the patterns of ecological characteristics in the landscape or seascape, providing a natural framework for recognising and responding to biodiversity values.
Ecologically Sustainable Development (ESD)	development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations (Council of Australian Governments, 1992).
Ecological Vegetation Class (EVC)	a classification that describes a collection of floristic communities occurring across a biogeographic range, that although differing in species have similar habitat and ecological processes operating. Each ecological vegetation class is described through a combination of its floristic, life form and reproductive strategy profiles, and through an inferred fidelity to particular environmental attributes.
Ecotone	the transition zone or edge community which arises, naturally or as a result of human intervention, along the boundary or interface between two or more different communities; it can be visualised as the zone of spatial overlap of two adjacent communities and can be characterised as the zone in which edge effects are felt.
Indigenous	originating in and characterising a particular region or country; native
Provenance (tree-ferns)	the geographical area and environment to which the parent tree-ferns are native and within which their natural genetic constitution has been developed through natural selection (tree-ferns are considered a similar provenance for tree-fern farms if they from within 25 km of the sowing site).

CONTENTS

Foreword

This management plan details the requirements for the harvesting, cultivation and trading of tree-ferns in Victoria. It is intended for use by Department of Natural Resources and Environment (NRE) staff and municipal staff as well as industry and the public.

The aim of the Management Plan is to meet the requirements of the tree-fern industry within an Ecologically Sustainable Development (ESD) framework.

The purpose of the plan is to introduce procedures for ecologically sustainable tree-fern harvesting in Victoria and to clarify the approval process and requirements for both harvester and trader.

The Federal agency, Environment Australia, manages import and export permit applications under the Commonwealth environment legislation. Export applications for tree-ferns that have Victorian Government authority under this plan do not need to undergo further investigation and public consultation for the Federal Government, as previously required. The Federal Minister for the Environment and Heritage approved this plan in December 2001.

NRE will work collaboratively with those in the industry to implement the plan.

1 Introduction

The plan recognises the challenges of managing illegal taking[1] and trade, as well as allowing for the sustainable utilisation of wild-harvested tree-ferns, without threatening either tree-fern populations or compromising their significant role in forest ecosystems.

In terms of managing tree-fern utilisation, the plan primarily focuses on private land in light of the minimal take from public land both presently and as proposed in the near future. In particular, the plan retains the current policy of not permitting utilisation of tree-ferns from native forest on public land, other than from areas being permanently cleared, such as roadlines associated with forestry or other activities in State forest.

The plan maintains the strategy of minimising illegal taking, which is difficult to detect in remote locations, by making it difficult for poachers to find sales outlets. This is achieved through the requirement for all legally acquired tree-ferns to be tagged until the point of retail sale.

Whilst native flora in general should be protected from commercial wild-harvesting where possible, the introduction of exotic[2] tree-ferns, or cultivation of the same or other species from interstate, poses potential threats that need addressing before their use can be promoted.

1.1 The taxa dealt with in the plan

Tree-ferns is a generic term for ferns with trunks. There are six types (taxa) of native Victorian tree-ferns. This plan embraces the management of all Victorian native tree-ferns as well as exotic tree-ferns.

Victoria's six native tree-ferns are:

- Soft Tree-fern ('Man-fern' in Tasmania)
  Dicksonia antarctica Labill.
- Rough Tree-fern (or Prickly Tree-fern)
  Cyathea australis (R. Br.) Domin
- Slender Tree-fern
  C. cunninghamii Hook. f.
- Prickly Tree-fern
  C. leichhardtiana (F. Muell.) Copel.
- Skirted Tree-fern
  C. X marcescens N.A. Wakef.
- Austral King-fern (or Austral Tree-fern)
  Todea barbara (L) T. Moore

Generally under this plan only the following two taxa are available for commercial wild-harvest (other than geographically significant populations) subject to certain site-harvesting conditions.

- Rough Tree-fern (or Prickly Tree-fern)
  Cyathea australis (R. Br) Domin
- Soft Tree-fern ('Man-fern' in Tasmania)
  Dicksonia antarctica (Labill)

Due to their significance, the commercial wild-harvest of other native Victorian tree-fern taxa is restricted to various forms of salvaging (Refer to section 2).

1.2 Sources of tree-ferns

A range of tree-ferns, both native and exotic are traded in Victoria. These tree-ferns may have been wild-harvested in Victoria or interstate or derived from cultivated material.

Wild-Harvesting in Victoria

The majority of wild-harvested tree-ferns in Victoria come from private property, mostly in association with timber harvesting. The most commonly harvested tree-fern is the Soft Tree-fern. The additional effort in harvesting Rough Tree-ferns to prevent death in a plant's translocation militates against commercial harvesting.

Salvaging: This activity is defined as the removal of tree-ferns from areas that will either be permanently cleared or where an activity has or will lead to significant tree-fern mortality. Salvage associated with timber harvesting is referred to as integrated timber/tree-fern harvesting throughout this plan.

Timber harvesting operations often lead to high tree-fern mortality. The salvaging of tree-ferns is undertaken from both timber plantations (both softwood and hardwood) and native forest coupes on private property. Salvaging may take place pre or post-harvesting.

Selective harvesting: The selection and removal of tree-ferns from native vegetation, either manually or with machinery, that is not intended to be cleared or altered in any other way.

[1] take in relation to flora, means to kill, injure, disturb or collect flora. Harvesting is therefore read as taking

[2] introduced, non-Australian native species.

Cultivation

Nurseries: Native as well as exotic tree-ferns have been artificially propagated in nurseries for some time now. A large proportion of propagated Soft Tree-ferns are derived from Tasmania. Most are sold as small plants, smaller than the size usually collected from integrated timber/tree-fern harvesting operations.

Tree-fern farms: The establishment of tree-fern plantations on previously cleared private land is a new development in the tree-fern industry. Established tree-ferns may be planted in combination with other larger plants to provide a suitable microclimate. Smaller tree-ferns may naturally germinate or artificially propagated material may be planted out.

Imported mature tree-ferns

Soft Tree-ferns are shipped from Tasmania, and come as mature wild-harvested live tree-ferns or trunks, or as propagated nursery stock. Other species from interstate or imported from other countries enter as propagated material. There is only an occasional request to import trunked tree-ferns from other countries. The supply of mature Tasmanian tree-ferns routinely exceeds the number coming from Victorian forests. The importation of tree-ferns from Tasmania has substantially reduced the demand for wild-harvested Victorian tree-ferns.

1.3 The relevant agency, legislation and policy framework

The **Planning and Environment Act 1987** and the **Flora and Fauna Guarantee Act 1988** (FFG Act) provide the legislative framework for controlling native vegetation utilisation on private land.

The Planning and Environment Act underpins the Victoria Planning Provisions in which particular native vegetation provisions are provided. These provisions (clause 52.17) require a planning permit for removal, destruction or lopping of native vegetation subject to a range of exemptions. Local government is the responsible authority for issuing planning permits to remove native vegetation.

In making a decision to issue a planning permit under clause 52.17, the responsible authority must consider the State Planning policy (clause 15.09-2) on conserving native flora and fauna.

The strategy required under Section 17 of the FFG Act (FFG Strategy) provides the current policy for native biodiversity conservation. A major goal is that 'there is reversal, across the landscape of the long-term decline in the extent and quality of native vegetation, leading to a net gain, with the first target being no net loss by the year 2001' (NRE, 1997). The tree-fern management plan was developed taking into account the guiding principles[3] of the FFG Strategy (*ie* ecological, risk management and development).

The strategy in this plan was developed in line with the Victorian Government's response to the Inquiry Report into the Utilisation of Victorian Native Flora and Fauna by the Parliament of Victoria's Environment and Natural Resources Committee (ENRC, 2000).

The Government supports the principle of salvage of species that may be destroyed by some other legitimate process. Cultivation of native flora is encouraged and apart from general exemptions, wild-harvesting should be avoided other than that which may be salvaged or selectively harvested for cultivation. Cultivation of native flora most readily meets all three ESD objectives unlike wild-harvesting[4] (ENRC, 2000).

Regulatory and monitoring protocols must also be established that places the cost of utilisation clearly with the commercial user and not the Government. Under this plan there is an obligation on the proponent to provide adequate information to NRE in both applications and harvest monitoring assessments.

Wild tree-fern harvesting is governed by site-specific management plans. Selective wild-harvesting is restricted on private property to vegetation of low conservation significance[5]. Integrated timber/tree-fern harvesting on private property provides for retention of tree-ferns.

Support is given to the utilisation of tree-ferns from areas to be permanently cleared on public land. However a number of issues need to be addressed before the Government will support the removal of tree-ferns from logging coupes or other areas of public land that will ultimately be revegetated.

[3] Refer to 'Tools', Sustaining Our Living Wealth (NRE, 1997)

[4] Refer to ESD-based assessment, table 11.1

[5] Refer to Appendix 3 of Victoria's Draft Native Vegetation Management Framework (NRE, 2000).

The FFG Act governs legal commercial access to the sale of protected flora within the State. The Department of Natural Resources and Environment (NRE) is the agency responsible for administering this Act.

The FFG Act provides for Governor in Council to authorise the taking (except for the purpose of controlling), trading in, keeping, moving or processing of protected flora subject to the terms and conditions fixed by the Governor in Council in the Order [Section 48 (3)]. The most relevant Order to the taking and trade of tree-ferns was made by the Governor in Council in 1994, namely the Flora and Fauna Guarantee (Taking, Trading in, Keeping, Moving and Processing Protected Flora) Order 1994.

1.4 The FFG Act taking and trading (tagging) requirements

The 1994 FFG Order provides the following authorisations and conditions of trading for tree-ferns[6]. [*Note, these conditions may change pending revision in response to issues identified in this plan (Refer to section 4)].*

Authority to take protected flora from private land

A person may take tree-ferns from public or private land, for sale, only under an FFG Act permit. (*Note: On private land the landholder must also have authorisation to take from that land and the responsible authority may be required to grant a planning permit*[7]).

Authority to trade in, keep, move and process tree-ferns

Any person may trade in, keep, move or process tree-ferns where they have been taken and obtained

1. in Victoria in accordance with the **Flora and Fauna Guarantee Act 1988** or a permit or Order issued under that Act; or

2. lawfully outside Victoria and brought into Victoria.

Conditions of trading

A person may trade tree-ferns provided;

1. the living crown of any tree-fern which is handled for the purposes of trading is marked with a tag supplied by the Department of Natural Resources and Environment (*Note: This is taken as tagging as close to the crown as possible on the trunk and applies to all large and small plants with discernible crowns. For practical purposes plants without crowns are taken as those sold in trays or as tube stock or as small propagated tree-ferns in pots less than or equal to 25 cm. diameter. Only one tag is needed in instances where larger pots contain multiple propagated plants whose trunks and crowns have fused).*

2. while the tree-fern is in the possession or control of the person authorised to trade in it, the tag remains attached to the plant; and (*Note: Tree-ferns must be tagged as soon as possible upon harvesting and certainly before being transported away from the harvest site. Tags must then remain affixed until sold by retail. Imported tree-ferns need to be tagged as soon as practical when unloaded at the first point of distribution.*

3. when the tree-fern is sold by retail that the tag is cut in half by the retailer.

1.5 Management of non-commercial collection

It is a landowner's or lease holder's right to take tree-ferns (or to authorise others to do so) for non-commercial purposes from private property without authorisation, other than in critical habitat (FFG Act, Section 47 (2) (b & c). Anecdotal evidence suggests this activity occurs, although the extent and impact is unknown.

[6] 'tree-fern' under the 1994 FFG Order means any plant of the taxa *Cyathea* – tree-ferns, *Dicksonia antartica* – Soft Tree-fern, or *Todea barbara* – Austral King Fern.

[7] this only applies to living tree-ferns.

2 Wild-harvested tree-ferns

This section deals with the harvest of tree-ferns from the wild in Victoria.

Significant ecological issues prohibit the commercial wild-harvest of certain tree-fern taxa, or the harvesting of Soft and Rough Tree-ferns from particularly significant geographic populations or other significant habitat. These ecological constraints are briefly explained in the following section.

Section 2.2 provides details of conditions for FFG Act authorisation to wild-harvest. Summary charts of these details are found at the end of this section.

2.1 Ecological constraints

Significant tree-fern taxa

Due to their significance, the commercial wild-harvest of native Victorian tree-fern taxa, other than Soft and Rough Tree-ferns, is restricted to salvaging but does not include integrated/timber tree-fern harvesting given the potential for some to survive.

Both the Slender and Prickly Tree-ferns are recognised as threatened in Victoria, both being classed as vulnerable[8].

Skirted Tree-fern although a hybrid between the Rough and Slender Tree-fern, is excluded from commercial taking due to the likely damage to the habitat in harvesting it, as well as the potential to confuse it with one of its nearby parent plants, the Slender Tree-fern.

Austral King-fern (*Todea barbara*) is limited in some drier forest. Growth rates of Austral King-fern may be as slow as 60 cm per century in the wild (Bostock[9], pers. comm.). Over-collection in any one area may threaten its survival given their limited occurrence and very slow growth rate (McDougall[10], pers. comm.). The current take of Austral King-fern is minimal and prohibiting collection is unlikely to affect traders, some of whom keep a limited number of artificially propagated Austral King-ferns.

Geographically significant populations

Due to their significance, the commercial wild-harvest of geographically significant Soft and Rough Tree-ferns populations is restricted to salvaging but does not include integrated/timber tree-fern harvesting given the potential for some to survive.

Protecting the inherent variation of native flora and fauna is an objective of the FFG Act. Managing the harvest of tree-ferns therefore requires conservation of the likely remaining genetic variation. In contrast to popular belief, geographic ranges of fern species are generally comparable to those of seed plants and bryophytes, and hence it is likely that there are significant tree-fern populations across the range. Research into geographic variation in Victorian tree-ferns is lacking. In the absence of this information, criteria for identifying geographically significant populations from both state and national perspective's are provided in Appendix 1.

Wider conservation issues

This plan only permits the commercial selective harvest of tree-ferns from sites of low conservation status – see section 2.2. The presence of epiphytes will also preclude selective harvesting of individual tree-ferns and may also form the basis for identifying tree-fern retention areas in integrated timber/tree-ferns harvesting operations.

Tree-ferns are keystone species in particular habitats. The trunks of tree-ferns when they exceed about 1.5 – 2 m height, are important substrates for epiphytes such as orchids, ferns and bryophytes (mosses and liverworts) some of which are almost entirely restricted to tree-ferns (so called obligate epiphytes). In Wet Forest and Riparian Forest, the trunks are also nursery sites for some tree and shrub species, which are facultative epiphytes, and are important for the re-establishment of these species in forests (Cameron[11], pers. comm.). Refer to Appendix 2 for more details.

Rainforests (Cool Temperate and Warm Temperate) and the rare floristic communities of Cool Temperate Mixed Forest[12] are the most significant habitat for tree-fern epiphytes, particularly in the deepest, least-disturbed sheltered gullies. Other important communities include Fern Gully vegetation, old growth Wet Forest, Riparian Forest and Rainforest ecotones.

[8] Conservation status: as per NRE Flora Information System.

[9] P. Bostock, senior botanist, Qld. Herbarium

[10] S. McDougall, Flora and Fauna officer, NRE.

[11] D. Cameron, senior botanist, NRE.

[12] Refer to Peel (1999) for details

2.2 Conditions of FFG Act Authorisation

In addition to FFG Act authorisation from NRE, approval to remove native vegetation should be sought from the relevant responsible authority administering the **Planning and Environment Act 1987**. In most cases Local Government is the responsible authority.

FFG Act authorisation to take tree-ferns for sale from the wild from any tenure must be dealt with through NRE regional offices. NRE regional officers with delegated authority may issue an FFG Act permit and tags for the commercial taking of tree-ferns within their region from private land but not from public land. Authorisation to take for sale from public land will be referred on as this may only be granted by the Executive Director, Parks, Flora and Fauna Division (PFF). Refer to sub-section 1.4 for trading and tagging requirements.

FFG Act authorisation requires proof that an applicant is either the owner or lessee by way of copies of title, lease or a statutory declaration for Section 47 (2)b of the FFG Act, or that either the owner or lessee has granted authorisation. Permit application and consent forms are available from NRE regional offices or from the Internet at www.nre.vic.gov.au.

Site inspections and permit conditions

NRE may choose to undertake the initial inspection, and post harvesting monitoring where necessary, or request that an independent third party do so on behalf of the applicant.

Proposed harvesting areas must be inspected prior to harvesting in order to:

1. ensure that there are no ecological constraints as per sub-section 2.1,
2. verify the accuracy of the population size and hence the number of tags sought,
3. verify the accuracy and the appropriateness of the maps or other information that harvesting is conditional upon. Additional information may be sought as well as further areas for tree-fern retention or monitoring,
4. take photos from readily relocatable points for monitoring where necessary. Hip chain measurements from known points and a record of bearings or GPS readings must be used.

FFG Act authorisation will be conditional upon the various forms of harvesting being undertaken in a manner described in the following sub-sections and as specified in permits. Post harvest inspections will be undertaken to check compliance and monitor sites where necessary.

Private land

Salvage harvesting proposals

Sites to be cleared

Authorisation may be granted prior to permanent vegetation clearance, site maintenance or other approved clearing activities.

Integrated timber/tree-ferns harvesting – Native Vegetation

Where a planning permit is required to harvest timber (clause 52.17 of the planning scheme), FFG Act authorisation for the commercial taking of Soft or Rough Tree-ferns will be conditional upon acceptable proposals being presented as an Integrated Timber/Tree-Fern Site-Harvesting Plan where the Timber Harvesting Plan is yet to be finalised. The site-harvesting plans must be in the form of a map identifying the area(s) to be harvested and a statement of conditions applying to the operation. Alternatively, the tree-fern site-harvesting information may form part of a Timber Harvesting Plan, as per clause 3.2.6 of the Code of Forest Practices for Timber Production [(the *Code*), (NRE, 1996)]. Refer to Appendix 4 for details.

Applications made prior to submission of a Timber Harvesting Plan must provide proof of an undertaking by the timber harvesters that the integrated timber/tree-fern site-harvesting measures will be stipulated in the Timber Harvesting Plan, and complied with during timber harvesting, to conserve the non-harvested tree-fern areas during timber harvesting.

Tree-ferns must be protected in *Code* exclusion areas other than filter strips where tree-ferns may be harvested subject to certain conditions.

Integrated timber/tree-ferns harvesting – Plantations

Where timber harvesting is exempt under clauses 52.17 and 52.18-3 from the requirement of a planning permit, FFG Act authorisation for the commercial taking of Soft or Rough Tree-ferns will be conditional upon acceptable proposals being presented with limited information (Refer to Appendix 4 for details required). Tree-fern harvesting must be restricted to the plantation area. Plantations where buffer and filter strips have been planted out may be used for tree-fern harvesting subject to conditions set out in clause 3.1.2.3 (Site Preparation) and clause 3.2.3 (Timber Harvesting - Water Quality Protection) of the *Code*.

Private land *cont.*

Selective harvesting proposals

Commercial selective harvesting of Soft and Rough Tree-fern is restricted to sites of low conservation status[13] with little potential for vegetation quality improvement. Consideration may also be given to wild-harvesting for the purpose of cultivation.

Conservation status takes into account both the bioregional security of the vegetation and its quality[14]. The bioregional conservation status of the Ecological Vegetation Class (EVC) must be 'common' in terms of pre-European coverage and secure in terms of percentage remaining[15].

The quality must be such that, apart from considering the potential for enhancement (*ie* where arguably off-sets[16] may be required), the harvesting extraction method and rate is unlikely to further lower it (including spread of diseases or weeds). Furthermore the harvesting must not compromise specific or wider conservation values relevant to tree-ferns (Refer to sub section 2.1 and Appendix 2). These restrictions apply to gully systems and drainage lines in agricultural landscapes as well as larger native forest remnants.

FFG Act authorisation will be conditional upon acceptable proposals being undertaken according to a Selective Tree-Fern Site-Harvesting Plan where deemed warranted by the NRE regions (Refer to Appendix 4). The plan will identify, in the form of a map, the area(s) to be harvested, contain a statement of conditions applying to the operation and incorporate a monitoring system. Harvesting in such environments must also adhere to the *Code*. Selective Harvesting Plans must only be planned within the time-frame of this management plan.

Public Land

Selective harvesting proposals

Selective harvesting of tree-ferns is not permitted from public land.

Salvage harvesting proposals

Sites to be cleared

Authorisation may be granted prior to permanent vegetation clearance, site maintenance or other clearing activities that NRE concurs with.

Permits may be devised regionally by Flora and Fauna staff and submitted to the PFF Executive Director for signing.

In State Forests, FFG Act authorisation will be conditional upon the harvesting complying with a Forest Coupe Plan. Operators must have a Forest Operators Licence and comply with a Forest Coupe Plan in terms of adhering to road construction alignments and compliance with the *Code* and regional harvesting prescriptions.

Integrated timber/tree-fern harvesting

Support is given in principle of salvaging tree-ferns from logging coupes on public land, subject to further research being undertaken to establish the ecological sustainability and operational viability of this action. Harvesting will not be permitted from public land logging coupes until these issues have been adequately addressed. Further details are provided in Appendix 3.

Actions

Investigate and report on the ecological sustainability and operational viability of integrated timber/tree-fern harvesting on public land.

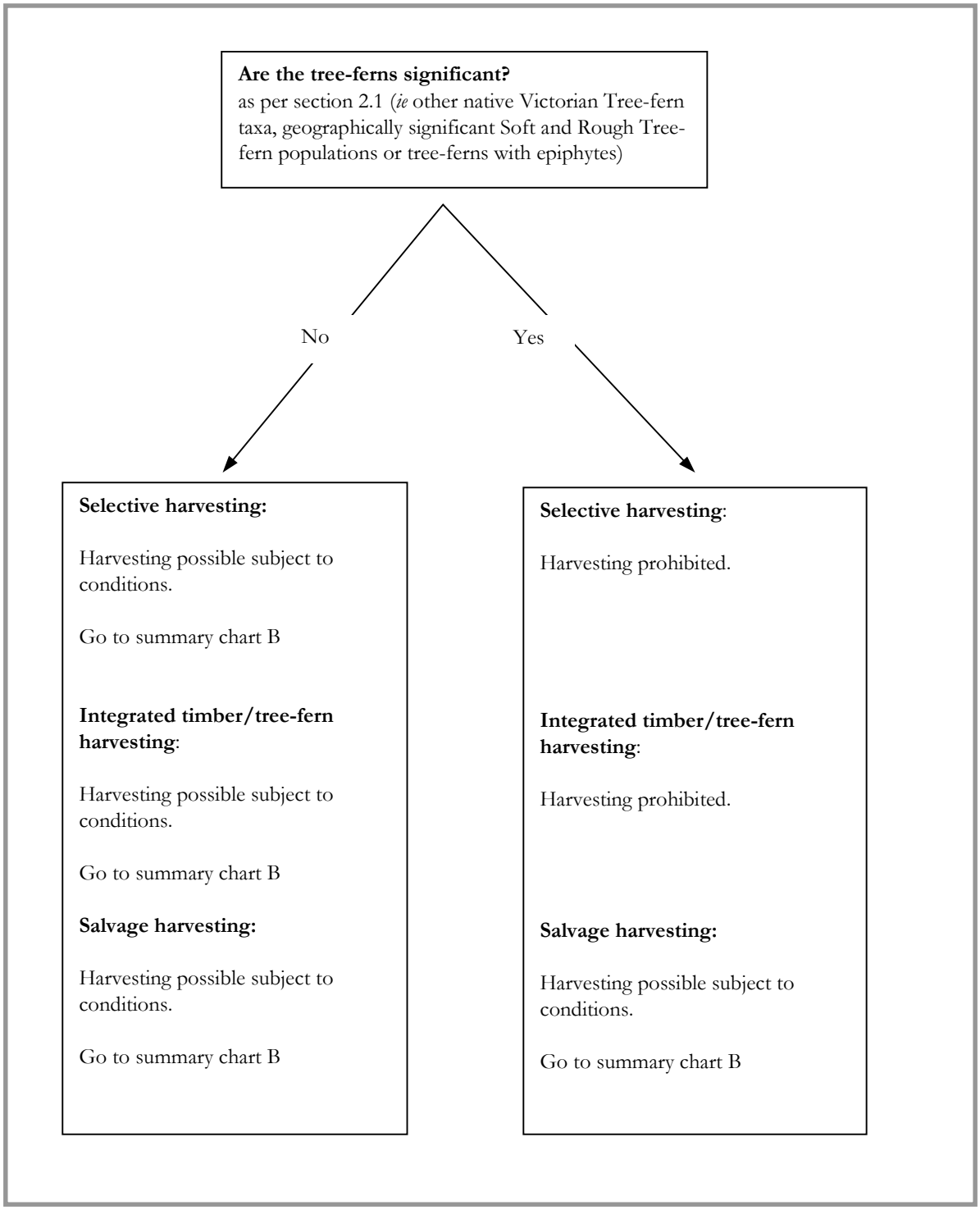
[13] Refer to Appendix 3 of Victoria's Draft Native Vegetation Management Framework (NRE, 2000).

[14] Refer to Appendix 1 (NRE, 2000). Note, these criteria are subject to change pending development of guidelines.

[15] Either **D2** or **LC**, refer to Appendix 2 (NRE 2000).

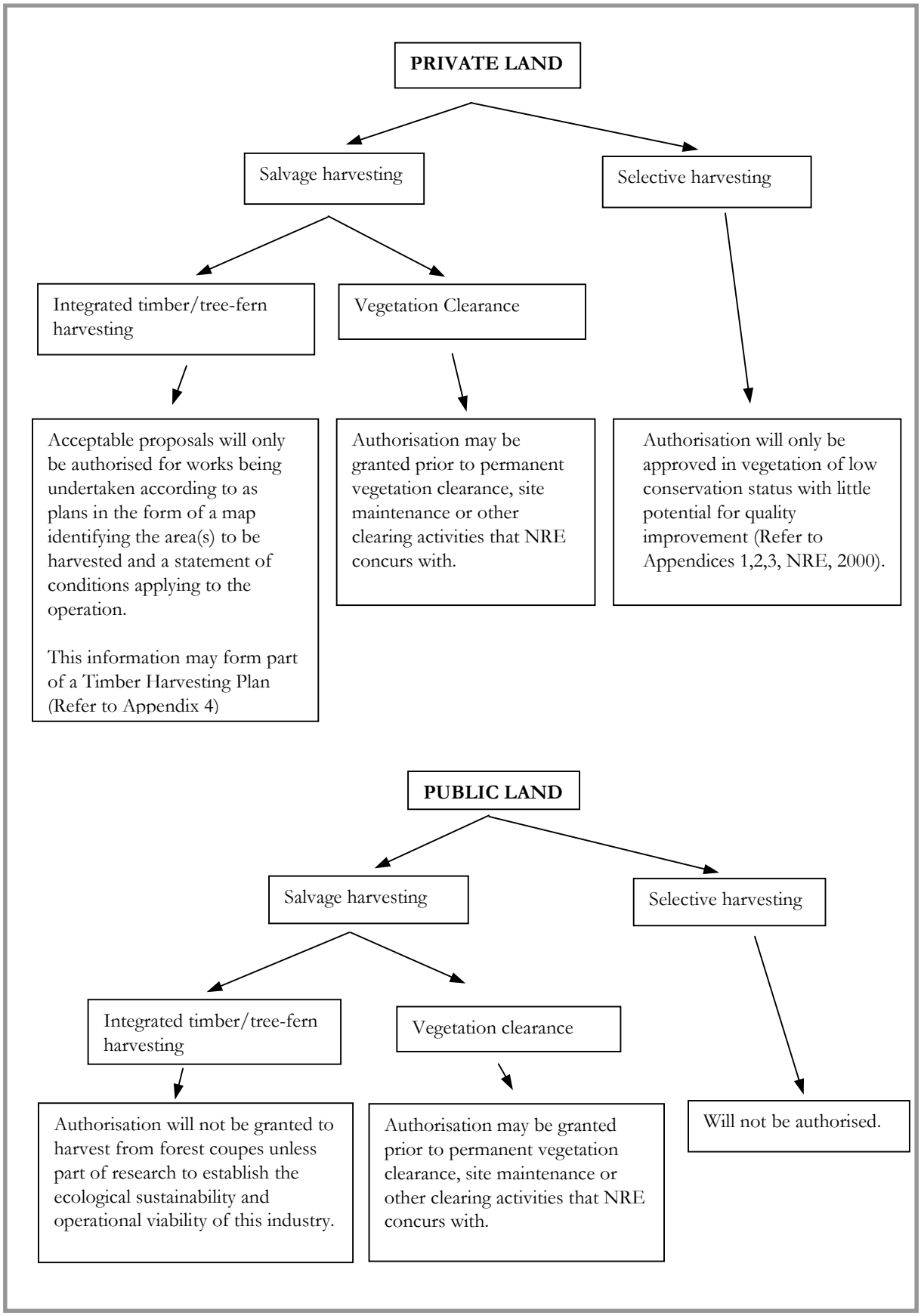
[16] Off-sets are part of the No Net Loss Native Vegetation Retention policy

Summary chart A: Ecological Constraints to Wild-harvesting



Summary chart B: Conditions of FFG Act Authorisation to Wild-harvest

Assumes authorisation has been obtained, where necessary, from the responsible authority



3 Cultivated and imported tree-ferns

This section provides details on conditions required for the sale of cultivated and imported tree-ferns. It also discusses potential ecological issues associated with exotic and non-Victorian tree-ferns.

Refer to sub-section 1.4 for trading and tagging requirements. Application forms for tags for the sale of cultivated and imported tree-ferns may be obtained through the NRE regional offices or from the Internet at www.nre.vic.gov.au. NRE officers may need to inspect premises to validate tag requirements.

3.1 Cultivated tree-ferns

Nursery cultivated

There are varying viewpoints within the industry regarding the merits of licensing growers under the FFG Act to mark their own stock. Resolution of this issue should occur within the first year of this plan, including requisite changes to the 1994 FFG Order (Refer to next section). Until this issue is resolved, the 1994 FFG Order tagging requirements still apply.

Farm cultivated

The farming of tree-ferns currently involves operations that mix wild-harvested tree-ferns with artificially propagated and self-propagated material. All farmed tree-ferns will require tags until such time as a system is devised by industry to distinguish between this material and the 1994 FFG Order is changed accordingly.

The cultivation of tree-ferns is encouraged as an alternative to wild harvesting. For farms this means growing provenance tree-ferns as risk management against genetic mixing (Refer to Appendix 1). FFG Act authorisation may in future only be granted to sell farmed native Victorian tree-ferns of local provenance. Farms adjacent to geographically significant populations should use spore material from that population.

Where a farmer has property with a relatively large naturally occurring tree-fern population, the issuing of tags will be conditional upon suitable proposals being undertaken according to an approved Tree-Fern Farm Plan (Refer to Appendix 4 for details). NRE may choose to undertake the initial vegetation assessment, and ongoing monitoring where necessary, or request that an independent third party do so on behalf of the applicant.

3.2 Imported tree-ferns

Imported tree-ferns in shipping containers need to be tagged as soon as practical when unloaded at the first point of distribution. Tagging interstate with FFG Act tags or recognition of interstate tags are options that may be explored and may negate this requirement in the future.

3.3 Potential ecological issues

The following issues need addressing however before farming of non-local native or exotic tree-ferns is encouraged. These issues may also impact on the import and sale of exotic tree-ferns.

Weed risk

The introduction of exotic tree-ferns, as well as those derived from other states, may pose a weed risk to native vegetation. The perceived risk posed by exotic plants is that they may invade native vegetation and compete with and replace native flora leading to habitat degradation.

Whilst some tree-ferns, including Australian natives are weeds elsewhere (Low, 1999), there is no evidence of this to date within Victoria. An evaluation of this issue will be undertaken, one that takes into consideration the actual and potential threats posed by exotic tree-ferns species.

Under the **Catchment and Land Protection Act 1994** exotic tree-ferns species could be declared as noxious plants, thereby imposing further controls over their propagation, sale and distribution.

Genetic mixing

The introduction of taxa native to Victoria which originate elsewhere may lead to gene pool mixing, particularly when cultivated in large numbers in close proximity to native vegetation. This issue has been raised by ENRC (2000). For more information about gene pool mixing refer to Appendix 1.

Actions

Assess the weed risk posed by non–Victorian and exotic tree-ferns.

Assess the risk of gene pool mixing associated with the cultivation of tree-ferns.

4 Amending the tagging system

4.1 Tagging live tree-ferns

Cultivated tree-ferns

The tagging system is a key component of preventing the sale of illegally harvested tree-ferns, however the system is not intended to disadvantage the tree-fern industry. The requirement to tag propagated material once it crowns for instance needs reviewing, as it may impose unnecessary imposts to some industry members. As discussed in sub-section 3.1, further effort is needed to address this issue with industry.

Wild-harvested tree-ferns

Transport of untagged tree-ferns by industry compromises efforts to eliminate illegal trade. Site tagging is consistent with other forms of utilisation. The suitability of tags to withstand rough treatment during the trading chain is an issue for some harvesters. Improvements have been made and will be continually reviewed to facilitate harvester compliance with site tagging.

Tag design and currency

There are reports of traders failing to comply with tagging requirements. This includes the requirement to cut tags in half at the point of sale. The need for a non-reusable tag or to remove this requirement needs assessment.

Some traders are also failing to comply with ensuring that tree-ferns are tagged at all times whilst in their possession, including when sold. The practice of selling untagged tree-ferns provides scope for laundering, a potential that is facilitated by the unlimited currency life of tags. Improved compliance with tagging requirements will reduce this likelihood. The merits of altering the tagging system to introduce tags with an expiry date will be determined by pending compliance investigations (Refer to section 5).

The current measures to prevent non-surplus supply of tags to harvesters and importers, and industry education about compliance are the preferred management measures.

4.2 Tree-fern parts and products – assessing the need to tag

Products made from tree-ferns do not require tagging. The usual products made from tree-ferns are intended for the nursery trade, *ie.* tubs, troughs, stakes and supports for hanging baskets. Other products that are occasionally marketed are based on the use of tree-fern fibre in products such as manufactured pots, weed mats and mulch.

The source of this material is currently dead trunks left standing after Tasmanian timber harvesting operations. If such products gain wide market acceptance, source material may be more widely sought. Currently, where the source of such material is from tree-ferns already harvested for their crowns, enforcement problems are not increased by the presence of objects made from trunks. If, however, the demand (and price) for such products increased to the point where harvesting tree-ferns solely for their trunks (and discarding the crowns) became economically viable, tagging and additional checking would become necessary to prevent illegal harvesting for such purposes.

Monitoring the type and scale of commercial sale of products is a necessary action under this plan. This is a task that enforcement officers may undertake as part of compliance evaluation. At this time, it is not considered necessary to require individual tags for processed tree-fern products.

Actions

Revise tagging system pending
- **industry liaison for nursery cultivated material,**
- **compliance investigations and industry consultation.**

Revise FFG Order in light of changes to tagging requirements

5 Monitoring compliance

5.1 Enforcement

The tagging system as outlined in the previous section is central to curbing illegal harvest. Far greater effort is required to detect poaching compared to detecting illegal trade.

The compliance rate of harvesters and traders and the reasons for non-compliance will form part of compliance checks. Actions may be identified in annual compliance reports aimed at enhancing compliance rates. This may involve industry liaison to address particular issues. Improvements to the tagging system for instance, that may aid industry without compromising its purpose, have been identified in the previous section.

5.2 Record keeping

No returns are required or envisaged from harvesters at this stage. Similarly, no method has been established to guide traders with record keeping. The lack of even basic details on the movement of tree-ferns has hampered compliance checks in the past. Any move to enforce record keeping need only be confined to wholesalers of significant numbers of wild-harvested tree-ferns. The usefulness or otherwise of the record keeping for enforcement should be reviewed as part of annual compliance reporting. If warranted, the method of record keeping should be devised in consultation with wholesalers so as not to unduly burden the industry.

Actions

Undertake inspections and report annually on

- **compliance rates and reasons for non-compliance (tailor enforcement efforts in ensuing years to meet specific compliance targets in conjunction with industry liaison),**
- **the scale and type of tree-fern parts and products traded and the need if any to control trade with tags (Refer to sub-section 4.2),**
- **the merits of tagging system revisions (Refer to sub-section 4.1),**
- **the need if any to request record keeping (Refer to sub-section 5.2).**

Continue to investigate suspect activities observed by NRE officers, or those reported by industry, other agencies or members of the public and record all instances of reports and NRE's response.

6 Community awareness

Industry could benefit by encouraging the reporting of instances of suspected illegal harvesting and trade.

The public as consumers, and ultimately wild Soft Tree-fern populations, may benefit from a heightened awareness about tree-fern care and their potential to die without adequate moisture and shade.

A reduction in the mortality of tree-ferns in domestic situations lessens the demand for wild-harvested tree-ferns and is part of the consideration of sustainable harvesting. That is, the likelihood of mortality in domestic situations is an aspect of ecologically sustainable harvesting. The benefits of purchasing propagated Soft Tree-ferns or the more hardy Rough Tree-ferns may also lessen this demand. Once established the Rough Tree-fern is more tolerant than Soft Tree-ferns depending upon the climate and exposure to sun. The promotion of Rough Tree-ferns as hardier and faster growing (See Appendix 2) plants may be an important adjunct to reducing the demand for wild-harvested Soft Tree-ferns.

Action

Encourage industry to educate people about the ecological significance of wild tree-ferns, caring for tree-ferns in cultivation, alternative options, the tagging requirements and the role that they may play in reporting suspected poaching or illegal trade.

7 Environment Australia reports

7.1 Quarterly

Environment Australia requests quarterly reports on tag details of tree-ferns intended for export with location details of harvest and regional office of issue.

7.2 Mid-term and final

Environment Australia, requires a mid-term and final report for management plans.

Action

Prepare reports for Environment Australia as required.

8 Reviewing the plan

8.1 Review

The management plan is primarily directed at controlling the commercial harvesting and trade in tree-ferns for conservation reasons. The desired outcome is that there is an ecologically sustainable tree-fern industry.

A key element of the FFG Strategy is the adoption of accountability for performance, by placing greater emphasis on reporting achievements (*ie* outputs, preferably outcomes), rather than reporting solely on activities (resource inputs). The FFG Strategy states that 'the broad objectives of the Biodiversity Reporting Framework are to clarify the achievements of biodiversity conservation activities and to ensure that appropriate feedback on outcomes continually improves the design and targeting of plans.' (See Reporting Framework, Directions in Management, NRE, 1997).

The review is part of an adaptive management cycle for biodiversity conservation. Areas of review are the strategic direction, inventory, planning, management, monitoring actions and environmental outcomes monitoring.

Performance indicators may be based on:
1. the level and type of industry engagement,
2. the compliance level,
3. wider community acceptance,
4. the administrative cost relative to the value,
5. the establishment of local provenance tree-fern farms.

8.2 Cost Recovery

There is a proposal to review the FFG Act in line with the ENRC (2000) recommendations. Cost recovery will be part of that process.

Actions

Produce a Tree-fern Management Plan Review upon expiry of this plan for public consultation.

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Appendix 1

The potential for geographic variation in tree-ferns

According to Peck *et al.* (1990) geographic variation across the range of a fern species is generally comparable to that of seed plants and bryophytes. It is often assumed that tree-fern spores are able to disperse and migrate in a superior manner to seed plants. Some ferns are capable of long distance dispersal. Anecdotal evidence suggests that tree-ferns may colonise areas significant distances away from the nearest population. The range however over which tree-ferns may disperse is unknown. There are significant differences in the range of genetic and ecological attributes of the sporophyte and gametophyte populations of homosporous pteridophytes. For instance, while their spores are presumed to be easily wind dispersed (Peck *et. al.*, 1990), this has been found to be a function of the surface patterning (Tyron, 1976). Spore dispersal is overwhelmingly local and most spores do not reach habitats suitable for germination and development into viable gametophytes. (Peck *et al*, 1990). Due to differences in fecundity, habitat specificity, mating systems and gametophyte ecology affecting early life history stages, only relatively few homosporous pteridophytes are able to disperse widely. There are certainly likely to be intraspecific differences between Tasmania and mainland tree-ferns. Differences between flowering plants often go back to the late Tertiary *ie* several million years (Whiffin[17], pers. comm.). The situation is unknown for non-flowering plants. Even within Victoria, it is probable that tree-fern restriction to narrowly defined populations has led to divergence between populations.

Identifying geographically significant tree-fern populations

Until such time as the geographic variation of tree-ferns has been described, the following methodology should be used. The methodology is the same as that used in the National Estate component of the latter Victorian Regional Forest Agreement (RFA) assessments *ie* Gippsland, Western RFAs. Significant tree-fern populations in terms of disjunction or those at the limit-of-range should be based on the assumed or nominal pre-1750 geographic distribution as derived from the NRE's Flora Information System (FIS). All FIS records should be used but not grid values due to their limited accuracy – an actual site could be anywhere within the 10 minute grid (approximately 15 by 18 km).

Ordinarily, a population in the centre (core) of the taxon's geographic range may not warrant special consideration for inherent genetic variation, unless its habitat is significantly different, perhaps occurring in atypical habitat at the limit of an environmental gradient (topography, temperature, rainfall, geology etc). Populations within the centre of the pre-European range, in what appears to be rather typical habitat, take on greater conservation significance where surrounding tree-fern populations have been depleted through land clearance for human settlement or the vegetation has been significantly altered.

As a risk management approach it should be assumed that past timber harvesting activities have led to a reduction of tree-fern numbers from Victoria's mountain forests. Timber harvested areas should be treated in a similar manner for determining population significance to that of cleared land until further research clarifies the likely impact of timber harvesting. Determining the significance of a 'core' population must be based on the size of the area disturbed, or lost, in relation to likely pre-European distribution of tree-fern populations in a particular area. In timber harvested areas, consideration needs to be given the areas retained by the *Code* and the Comprehensive, Adequate and Representative reserve system established across public land. Interpretation also needs to be given to the limitations of mapped information such as sampling intensity.

In the absence of scientific information on geographic variation it should be assumed that tree-fern populations at the extreme edges of the species' range across the landscape, both spatially and in terms of environmental gradients within the range, are likely to be very significant for conservation. Disjunct populations are likely to be even more significant. Some core populations may also be significant as a result of European disturbance.

[17] Dr T Whiffin – Senior Lecturer, La Trobe University, Botany Department.

The significance of populations at the limit of their range

Places where a population occurs at the edge of its natural geographic range should be considered important as these locations reflect one or more environmental / biophysical features which limit the further expansion of the species' range. Under natural circumstances, these features may indicate past environmental change and / or evolutionary processes, but given the recent pattern of human occupation they may also reflect activities such as land clearance or disturbance from forestry.

Records identified at the extreme geographic limit of the main core of the tree-fern range represent limit-of-range. The extreme limit refers to the noticeable protrusions away from the distribution of the main core, although clearly in some instances these are not always obvious. Where isolated populations occur well beyond the limit of the main core, these may be considered to be better represented under the disjunct population criterion. Records identified at the extreme environmental limit within the main core also represent limit-of-range. Such environmental extremes may be determined by altitude, temperature, rainfall, soil type etc.

The significance of disjunct tree-fern populations

Places where disjunct populations occur are considered important from an evolutionary point of view due to99333399 their isolation from gene flow. This disjunction may have arisen due to mechanisms such as a break in a formerly continuous distribution, or to long distance dispersal over a barrier.

Disjunct populations are defined as those outlying populations that are separated from the main core of a taxon's distribution. Determining whether a population is disjunct is dependent upon the relative separation from the main core, the overall distribution of the species in the region and the impact of land clearing or forestry.

Gene pool mixing

The practice of importing Tasmanian tree-ferns, or moving Victorian material around the state may have had implications for the maintenance of gene pools of indigenous tree-ferns. Movement of tree-ferns through trade may have led to or may continue to lead to a mixing to some degree of gene pools through the process of introgression *ie* hybridisation.

The potential for introgression is organism dependent, varying on the degree to which the gene pools have diverged and the ability of new gene pools to swamp indigenous populations, that is when the number of imported plants is sufficient to impact on small indigenous populations (Murray[18], pers. comm.).

Natural selection may play a large role in eliminating hybrid progeny. Alternatively, introgression may lead to hybrid vigour, a phenomenon where the progeny have a competitive advantage over the parents, one that may possibly lead to the hybrids outcompeting the original population and possibly other native vegetation, *ie* having wider ecological ramifications. In the absence of any research however, the genetic variation across the range of tree-ferns is unknown and the significance of possible gene interchange remains one of speculation.

Genetic modification has implications under the FFG Act with respect to two of its seven objectives (Section 4), namely to retain the potential for evolutionary development (4a) and to maintain genetic diversity (4e). Movement of native species around their range will, for some organisms, be likely to be a threatening process (Murray, pers. comm.).

[18] Dr N Murray – Senior Lecturer, La Trobe University, Genetics Department.

Appendix 2

The ecological importance of tree-ferns

Growth rates of tree-ferns are highly variable depending upon the local environment and possibly their age. In general, in the wild, Soft Tree-ferns grow very slowly (0.4 up to, but less commonly, 4 cm/year), while Rough Tree-ferns average trunk growth at the faster rate of about 7 cm/year (Ough[19], pers. comm.). In Wet Forests of Victoria's Central Highlands, Soft Tree-ferns have been purported to live 500 - 1,000 years and Rough Tree-ferns at least three to four centuries (Mueck *et al.*, 1996) which is significantly older than the eucalypts they grow amongst.

The trunks of tree-ferns greater than 1.5 – 2m are important substrates for germination and growth of epiphytes such as orchids, ferns and bryophytes (mosses and liverworts) (Ough and Murphy, 1996). The trunks are also the nursery sites for some tree and shrub species, which are facultative epiphytes and are important for the re-establishment of these species in some forests (Cameron, pers. comm).

Some epiphytes are almost entirely restricted to tree-ferns (*ie* obligate epiphytes). Fieldia (*Fieldia australis*), which is commonly found on Soft Tree-ferns, has the distinction of being the only dicotyledonous obligate epiphyte in the Victorian flora. Whilst most epiphytic ferns are commonly found on Soft Tree-ferns, the rare Jungle Bristle-fern (*Cephalomanes caudatum*) is largely restricted to Rough Tree-ferns in Warm Temperate Rainforest. Jungle Bristle-fern is therefore especially vulnerable to disturbance in forests adjacent to rainforests as it frequently occurs in the ecotonal fringe upslope of the rainforest core. Some obligate epiphytes such as Fork Ferns (*Tmesipteris* species) are virtually restricted to the trunks of tree-fern species (Cameron, pers. comm.). Fork Ferns have a high phylogenetic significance since they provide an important evolutionary link to the early colonisation of freshwater and terrestrial habitats by advanced vascular plants some 400 million years ago (Drinnan[20], pers. comm.) These plants have changed little over this period and are an example of what may be referred to as living fossils. Sites with tree-ferns supporting threatened *Tmesipteris* species are of National Significance under the National Estate Criteria and should be protected.

Rainforests (Cool Temperate and Warm Temperate) and Cool Temperate Mixed Forest are the most significant habitat for tree-fern epiphytes, particularly in the deepest, least disturbed sheltered gullies. Other important communities are Fern Gully vegetation, Riparian Forest, Rainforest ecotones and old growth Wet Forests. The vast majority of Cool Temperate Rainforest occurs in the wettest areas of the State south of the Great Divide, in the Otway Ranges, Wilsons Promontory, the Strzelecki Ranges, the Central Highlands and East Gippsland Rainforest Regions. Victorian Cool Temperate Rainforest has been listed as a threatened community under the FFG Act.

In undisturbed old growth Wet Forest and Riparian Forest, the trunks of Soft Tree-ferns also act as a nursery site for the establishment of seedlings of some tree and shrub species such as Banyalla (*Pittosporum bicolor*), Prickly Currant-bush (*Coprosma quadrifida*), Mountain Pepper (*Tasmannia lanceolata*) and the Musk Daisy-bush (*Olearia argophylla*) (Ough and Murphy, 1996; Cameron, pers. comm.). The trunks, particularly fallen trunks, offer a very effective substrate that resists the scratching of Superb Lyrebirds (*Menura superba*) whose activities would otherwise destroy the seedlings (Howard, 1973).

Tree-ferns also provide essential habitat requirements for a range of fauna, from invertebrates to mammals. Native bees, in the genus *Exoneura* , utilise a wide range of flowering plants collecting nectar and pollen. They nest inside the dead stems of the both Soft and Rough tree-fern fronds that accumulate around the trunks (Sugden, 1988; Blows and Schwarz, 1991). Colonies of *Exoneura bicolor* are rarely found in substrates other than tree-fern fronds and are distributed according to tree-fern occurrence (Blows and Schwarz, 1991). Mountain Brushtail Possums (*Trichosurus caninus*) are known to feed on tree-ferns (Seebeck *et al.,* 1984). Although the reason is not clear, there is a positive correlation with the numbers of these possums and vegetation with high numbers of tree-ferns (Lindenmayer *et al.,* 1994). Another food source, hypogeal fungi, is at its highest abundance in such vegetation as well. Crimson Rosellas (*Platycercus elegans*) commonly feed on tree-fern spores. Furthermore, Rufous Fantails (*Rhipidura rufifrons*) have been observed foraging on invertebrates on the fronds and around tree-ferns (Loyn[21], pers. comm.).

[19] K. Ough, NRE researcher into tree-ferns and the effects of timber harvesting,

[20] Dr. A. Drinnan – Paleobotanist Melbourne University.

[21] R. Loyn, senior zoologist, NRE.

Appendix 3

Research into timber harvesting and understorey flora

Initial research in the wet forests of Victoria's Central Highlands indicates that clear-fell timber harvesting has led to the loss of tree-ferns from the understorey (Ough and Murphy 1996,1998; Ough pers. comm.). Mechanical disturbance associated with clearfell harvesting is a potentially threatening process as it has been found to impact upon the understorey composition, including tree-ferns (which are particularly sensitive), of mountain forest Ecological Vegetation Classes (EVCs) in the Gippsland RFA region (GCRA, 1999). These mountain forest EVCs include Damp Forest, Montane Wet Forest, Shrubby Damp Forest and Shrubby Wet Forest.

The Victorian Department of Natural Resources and Environment has, in light of these findings, been trialing modified logging practices to gauge the effects of logging on understorey flora with a view to maintaining the long term ecological integrity of forest environments (Ough and Murphy, 1996). In September 1998 NRE published a report about Understorey Islands describing the results of trials in the Central Highlands. The trials are ongoing to test a method of protecting sensitive understorey flora during harvesting in Mountain Ash (*Eucalyptus regnans*) dominated forest.

Appendix 4

Details of information required with tree-fern harvesting applications

Integrated timber/tree-fern harvesting from private native forests and plantations

The following information must be provided either as an Integrated Timber/Tree-Fern Site Harvesting Plan or as part of a Timber Harvesting Plan in instances where a planning permit is required to harvest timber. Where a planning permit isn't required, only points 1,2 and 4 are needed. Additional information may be required depending upon NRE regional requirements

1) Property details: crown allotment no., parish details and or block numbers

2) Topographic map (1:25,000 where vegetation mapping data are available) highlighting where tree-ferns will be protected from timber harvesting.

3) Specifications in the plan about
   - i retention (*ie* no harvesting) of any tree-ferns in parts of filter strips or buffers, and other protected areas, such as drainage lines (including gullies), swampy ground, spring areas or riparian vegetation;
   - ii the marking method of areas identified for tree-fern protection in the field prior to harvesting.

4) The number of tree-ferns to be removed from within the coupe prior to logging for the purpose of determining tag numbers.

5) Details of the operating method, in particular how the areas specified for retention of tree-fern harvesting will be afforded extra protection during timber harvesting operations, including
   - i. avoidable damage from falling trees;
   - ii. from snigging trees, as well as the means of minimising soil disturbance;
   - iii. from slash accumulation or from machinery or inappropriate crossing points and
   - iv. how other minimum *Code* requirements will be met.

Integrated timber/tree-fern harvesting from public forests

If and where harvesting proposed on native forests on public land is approved for research, the details of the approach to conserving areas of tree-ferns and monitoring survival and recruitment need inclusion in the regional prescriptions. The use of Understorey Islands as per Appendix 1 of Ough and Murphy (1998) and/or adoption of more appropriate best practice as research evolves will need to be included.

Appendix 4 (cont.)

Selective harvesting

The following information must be provided for a Selective Tree-fern Site-Harvesting Plan. Such plans must adhere to the relevant operational goals and guidelines in Chapter 3 of the *Code*. Additional information may be required depending upon NRE regional requirements. Monitoring frequency will be determined by regional staff; this will be governed by the extent and frequency of commercial harvesting and the extent of naturally occurring tree-fern populations.

1) Property details: crown allotment no. and parish details:

2) Topographic map highlighting: (1:25,000 where vegetation mapping data are available)
   i. where native vegetation is present and where there is cleared land
   ii. the location of any previous tree-fern or other harvesting,
   iii. the location of tree-ferns across the property (natural or translocated),
   iv. the location of the planned annual harvesting areas. Constraints to selective harvesting are outlined in section 2.2.1,
   v. the location of tree-fern monitoring areas,
   vi. *Code* areas that are excluded from tree-fern harvesting within the planned harvesting area (*eg* for flora or fauna protection or habitat enhancement, water quality protection, landscape protection or significant sites as per the *Code*).

3) Details of the operating method including:
   i. relevant *Code* guidelines,
   ii. details of the method of extraction (mechanical apparatus, removal of entire plants or trunks with crowns).

4) Details about the tree-ferns to be harvested from particular areas annually including:
   i. the number to be harvested in the year of permit application and the percentage this represents of population this represents of the area to be harvested or farm crop,
   ii. if deemed necessary by regional staff, the percentages of approximate tree-fern heights (within half metre size ranges), and widths (within 10 cm diameter ranges). Depending upon vegetation quality, harvesting may be restricted to a thinning exercise rather than total removal.

5) Details on other information:
   i. any previous harvesting history related to areas shown on maps and the property in general, including details of physical evidence *ie* trunk bases,
   ii. details on sites where tree-ferns have been translocated to and/or from on a property, including past habitat manipulation,
   iii. proposed weed management responses,
   iv. measures taken to detect disease (*e.g.* fungal diseases such as Myrtle Wilt (*Chalara australis*) prior to harvesting and management responses to detection,

6) Details on monitoring regime including pre and post harvesting measurements of:
   i. vegetation quality (Refer to Appendix 1, Victoria's Draft Native Vegetation Management Framework (NRE, 2000), in the harvested areas,
   ii. tree-fern populations in non-harvestable areas and harvestable areas,
   iii. weed invasion,
   iv. the presence of disease (harvesting in areas found with disease should cease),
   v. identification of other *Code* issues.

Tree-fern farms

The information in points 1, 2 i-iii,& v, and 6i and ii above must be provided for a Tree-fern Farm Plan. Additional information may be required depending upon NRE regional requirements, and may include additional information about other properties that a farmer may have with naturally occurring tree-fern populations. Monitoring frequency and extent will be determined by regional staff; this will be governed by the extent and frequency of crop harvesting for commercial trade and the extent of naturally occurring tree-fern populations on a farmer's property.


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