Tree fern management plan for the Sustainable Harvesting, Transporting or Trading of *Dicksonia antarctica* in Tasmania 2022

Overview

This *Tree fern management plan* for the sustainable harvesting, transporting or trading of *Dicksonia antarctica* in Tasmania 2022 (*Tree fern management plan)* outlines a system to facilitate and regulate the sustainable harvesting of *Dicksonia antarctica* tree ferns in Tasmania. Conditions of this plan are consistent with conservation of *Dicksonia antarctica* in its natural habitat.

This *Tree fern management plan* is an approved Wildlife Trade Management Plan under Section 303FO of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999,* and is valid for five years from the date of publication.

This management plan has been prepared by the Forest Practices Authority on behalf of the Tasmanian Government in consultation with the Australian Government to meet the requirements of the Tasmanian *Forest Practices Act 1985* and *Environment Protection and Biodiversity Conservation Act 1999.* It replaces the *Tree fern management plan* that was approved by the Australian Government in 2017.

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1. Introduction

Dicksonia antarctica Labill. (manfern or soft tree fern) is a common and widely distributed tree fern found in Tasmanian wet forests. (**Note***: For the purpose of this management plan the use of the terms 'tree fern' and '*Dicksonia' *will refer to* Dicksonia antarctica *unless otherwise stated*). The population of trunked tree ferns in Tasmania is estimated to exceed 160 million, with more than 50% of the population occurring in formal and informal reserves (see Appendix 1).

Tree ferns have been long sought after for their aesthetic properties and have many horticultural applications. *Dicksonia* is a robust tree fern that can be cut, stored, transported and replanted. Cut stems will continue to grow successfully if the crown is intact. The primary use of this species is as a live trunked tree fern planted in gardens providing a 'palm-like' appearance. The trunk may be used for secondary horticultural products, such as plant pots, garden steps and mulch. Fronds are also used in floristry.

Forestry operations in Tasmania occur in wet eucalypt forests that support large populations of tree ferns. Integration of tree fern harvesting with timber harvesting operations undertaken under Tasmania's forest practices system, provides an opportunity to utilise a resource that is widespread, well-reserved and maintained at a landscape level under current forest management. Peacock and Duncan (1995) reported high tree fern mortality associated with forestry operations in wet eucalypt forests. Chuter (2003) demonstrated that there is good regeneration of the species following such events.

A detailed description of the distribution, conservation status, biology, and regenerative properties of *Dicksonia* is given in Appendix 1. Appendix 1 also includes information about other species of trunked ferns in Tasmania – they include two species (*Cyathea cunninghamii* Hook. f. and *Cyathea Xmarcescens* Wakefield) that are listed as threatened species in Tasmania. Appendix 2 details results of research undertaken during the 2017 *Tree fern management plan* reporting period and areas to prioritise future research.

The majority of tree ferns harvested in Tasmania are exported outside of Tasmania including to the Northern hemisphere. Tree ferns are particularly suitable for Europe's temperate climate. Tree ferns fill a niche market as many other fern species available on the world market are tropical species.

Commercial harvesting and export of tree ferns has been taking place for many decades in Australia. Under provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), exports of specimens for commercial purposes must be from an approved source. (**Note**: *Any references to specific Acts, codes, policies etc. applies to any subsequent amendments or versions*). The Australian Government approval is a Wildlife Trade Management Plan, which must be signed by the Australian Government Minister for the Environment and published on the Federal Register approved Wildlife Trade Management Plans. In 2001, the *Tree fern management plan for the sustainable harvesting, transporting or trading of Dicksonia antarctica in Tasmania* (Tree fern management plan) was developed by the Forest Practices Board (now the Forest Practices Authority), in consultation with Environment Australia [now the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW)]; the Tasmanian Department of Primary Industries, Water and Environment [now the Department of Resources and Environment Tasmania (NRE Tas)] and other stakeholders.

The introduction of the 2001 *Tree fern management plan* and amendments to the Tasmanian *Forest Practices Act 1985* and Tasmanian *Forest Practices Regulations 2007* incorporated commercial tree fern harvesting into the forest practices system. The meaning of 'trees' in section 3 of the Act includes tree ferns. Section 18A of the Act requires the FPA to issue a tag to a person if it is satisfied that a forest practices plan exists enabling that person to harvest tree ferns. Section 18B provides the requirements for trading in tree ferns.

The *Tree fern management plan* was revised and received Australian Government authorisation in 2005, 2007, 2012, and 2017.

This *Tree fern management plan* applies to all land tenures in Tasmania. Tree fern harvesting prescriptions must be in accordance with the principles detailed in this plan and must be conducted under a certified forest practices plan (FPP).

The sustainable harvesting of tree ferns under the terms of this management plan will be permitted as follows:

- salvage harvesting from native forest to be cleared permanently or converted to another use in accordance with Tasmania's legal and policy framework
- harvesting of tree ferns from authorised native forest harvesting and reforestation where harvesting prescriptions will be applied to maintain local and regional populations
- harvesting in existing softwood and hardwood plantations
- harvesting of tree fern plantations or nursery sites.

2. Aims of this management plan

The aims of this management plan are to:

- Facilitate the sustainable harvesting of tree ferns from native forest subject to intensive forestry operations (where permitted by the landowner/manager and in accordance with the terms of this management plan) or tree fern plantations and nursery sites.
- Provide effective and efficient regulation of tree fern harvesting in Tasmania.
- Educate stakeholders on the regulation of tree fern harvesting in Tasmania.
- Foster research into the distribution, ecology and sustainable harvesting of tree ferns.

3. Outcomes from this management plan

The anticipated outcomes of this management plan are to:

- Ensure that tree fern harvesting is undertaken in a sustainable manner, and in accordance with current policies and legislation.
- Reduce the incidence of illegal harvest of tree ferns from public and private land in Tasmania.
- Ensure that all stakeholders are aware of regulatory, operational and conservation requirements, so that tree ferns are managed sustainably.

- Integrate research findings into the management and conservation of Tasmania's tree fern populations.

4. Definitions

The following terms are used throughout this management plan:

- **Commercial tree fern harvesting** – Harvesting of tree ferns for the purposes of trade, or harvesting when more than six tree ferns are taken from applicable land in a year (see the *Forest Practices Regulations 2017*).
- **Formal Reserve –** A reserve equivalent to IUCN Protected Area Management Categories I, II, III, IV, or VI as defined by the IUCN Commission for National Parks and Protected Areas (1994).
- **Informal Reserve –** A reserve on Permanent Timber Production Zone Land (PTPZL) (known as State Forest up to November 2013) comprising an area identified as a Protection Zone under the Management Decision Classification System or other administrative reserve on Public Land which is managed to protect comprehensive, adequate and representative (CAR) reserve values.
- **Landscape –** A conceptual planning unit or view field, generally of 200 – 1000 ha in area, which typically comprises a catchment of a class 2 stream as defined by the *Forest Practices Code 2020* and occupies a topographic range from an upland landform (e.g., hills and mountains) to lowland landforms (e.g., valleys and basins).
- **Salvage harvesting** – Harvesting of a resource that would otherwise be destroyed or harvesting trees after a major disturbance such as fire, flood or wind throw event.
- **Tree fern –** *Dicksonia antarctica*.

Tall *Dicksonia* growing in Southern Tasmania

Tall wet eucalypt forest with a dense *Dicksonia* understorey

Live *Dicksonia* being harvested

Dicksonia tagged and packed into a refrigerated container ready for export. **Note:** Some tags are not visible due to stacking.

Tasmanian *Dicksonia* for sale in the United Kingdom

Tasmanian Tree fern Tag number 258301

5. Context of tree fern harvesting in Tasmania

The harvesting of tree ferns for the period 30/6/2002 to 30/6/21 (Table 1) shows that the peak of harvesting occurred in 2002 to 2007 and then steadily declined to reach its nadir in 2012–13. The harvesting of tree ferns has gradually increased as the forest industry has recovered. Appendix 4 provides a summary of tree fern harvesting over the 2017 *Tree fern management plan* reporting period, including a break-down of tag sizes purchased.

Table 1 - The harvesting of tree ferns 2002 to 2021 (source FPA Annual Reports)

Year	Total no. of forest practices plans certified	No. (%) of plans that permit the harvesting of tree ferns	No. of tree fern tags issued by the FPA
2002–03	940	39 (4%)	64,182
2003–04	1,001	26 (3%)	54,886
2004–05	942	32 (3%)	61,368
2005–06	897	33 (4%)	45,131
2006–07	906	18 (2%)	54,802
2007–08	924	36 (4%)	35,352
2008–09	838	35 (4%)	17,529
2009–10	847	25 (3%)	19,905
2010–11	660	29 (4%)	10,729
2011–12	399	20 (5%)	22,177
2012–13	729	19 (3%)	8,572
2013–14	523	16 (3%)	8,982
2014–15	457	4 (1%)	11,014
2015–16	475	11 (2%)	13,086
2016–17	543	19 (3%)	14,390
2017–18	607	12 (2%)	25,300
2018–19	654	17 (3%)	14,656
2019–20	551	14 (2%)	20,420
2020–21	464	10 (2%)	36,287

Under this management plan, tree fern harvesting will generally be integrated with forestry activities in wet eucalypt forests – either in areas that will be converted to another land use, or in areas that will be regenerated to native forest. The Tasmanian Government *Policy for Maintaining a Permanent Native Forest Estate 2017* prohibits broad scale clearing of native forests except for prescribed circumstances. Conversion of native forest containing tree ferns to other land use is minor. Timber harvesting and subsequent reforestation (forestry operations) involves harvesting of trees and disturbance of understory vegetation, including tree ferns. This is followed by regeneration practices which result in establishment and growth of eucalypts and understorey species, including tree ferns. Tree fern harvesting in forestry operations

allows for utilisation of tree ferns without compromising the maintenance of the species in the landscape.

It has been estimated that there are approximately 160 million trunked tree ferns in Tasmania (see Appendix 1 – 'Ecology and Distribution of *Dicksonia antarctica*'). Trunked tree ferns are those that have progressed from an immature stage to a trunk-forming stage. Approximately 74 million of these trunked tree ferns are reserved in formal and informal reserves. This figure includes tree ferns within Tasmania's public reserve system and reserves on private land. There are also substantial areas of wet eucalypt forest outside reserves that are not available for timber harvesting because of requirements under the *Forest Practices Code 2020*.

In areas subject to forestry operations, tree ferns are retained through the *Forest Practices Code 2020* and prescriptions in certified forest practices plans to retain intact forest patches, including streamside reserves, habitat clumps, wildlife habitat strips, aggregates and 'tree fern islands' (areas with high densities of tree ferns that may be subject to constraints in forest practices plans). Reservation and retention of tree ferns provides a substantial source of spores for regenerating the species in the harvested area. Tree ferns produce copious amounts of spores that are distributed by wind and readily develop into sporophytes that colonise regenerating forests. Tree ferns in retained patches support late-successional epiphytes, hence contributing to the maintenance of biodiversity and providing a resource of propagules for recolonisation of the regenerating forests by these species.

6. Regulation of forest practices (and tree fern harvesting)

Most forestry operations exceeding one hectare in Tasmania (on public or private land) require a forest practices plan (FPP) under the *Forest Practices Act 1985* (**Note:** the exceptions are detailed in the *Forest Practices Regulations 2017*). The *Forest Practices Act 1985* is monitored and enforced by the Forest Practices Authority (FPA). Forest practices plans (FPPs) are prepared in accordance with the *Forest Practices Code 2020*, which details provisions for the protection of natural and cultural values. These values include flora, fauna, geomorphology, soils, water, cultural heritage and visual amenity. The FPA employs a team of specialists to provide advice in relation to managing natural and cultural values.

Tree fern harvesting must also take account of issues relating to hygiene and quarantine. The risk of introducing pests and diseases into the proposed harvesting area must be assessed, and hygiene measures implemented if a risk is identified. Tree fern harvesting procedures also need to take account of quarantine requirements associated with the export of ferns.

Under section 40 of the *Forest Practices Act 1985*, authorised Forest Practices Officers (FPOs) have powers to enforce compliance with the Act, Code and prescriptions in a certified forest practices plan. FPOs have powers to issue corrective action requests and notices. There are penalties for non-compliance. At the completion of each phase of the forestry operation indicated in the FPP (e.g. harvesting, reforestation) a compliance report must be signed off by an FPO and lodged with the FPA within 30 days. Audits are conducted on a representative sample of FPPs each year, to assess compliance.

6.1 Terms and conditions relating to tree fern harvesting

Terms and conditions relating to tree fern harvesting were included by amendment of the *Forest Practices Act 1985* in 2001, as part of the approval process for the 2001 *Tree fern management plan*. These terms and conditions are summarised below:

- 'tree ferns' are defined as *Dicksonia antarctica* and harvesting is restricted to this species (Section 3)
- harvesting operations must be covered by a certified FPP that includes a suitable prescription for tree fern harvesting (Section 18A)
- all harvested tree ferns must have a Tasmanian tree fern tag securely attached at the point of harvest (Section 18B).

The Forest Practices Regulation 4(f) prescribe that a forest practices plan is not required for the harvesting of tree ferns:

- with the consent of the owner of the applicable land; and
- no more than six tree ferns are harvested in each area of applicable land during one year.

6.2 Tree fern harvesting under the *Tree fern management plan*

This *Tree fern management plan* applies across all land tenures in Tasmania. Tree fern harvesting operations are regulated and enforced under the *Forest Practices Act 1985*, as described above.

6.3 Tree fern harvesting principles

- Extraction of tree ferns should not be the catalyst for forestry operations. Tree fern harvesting must not occur prior to a final land use decision being confirmed and the approval of a forestry operation, through the certification of an FPP, on the site.
- Tree ferns may be salvage harvested where they would otherwise be destroyed by timber harvesting activities and land clearing (this includes harvesting from existing hardwood and softwood plantations).
- Tree ferns may be harvested from other native forest operations if all the following conditions apply:
  - the harvesting of tree ferns and the forestry operation itself comply with appropriate regulations
  - tree ferns are retained at the landscape level and in the vicinity of the coupe (e.g., in streamside reserves, habitat clumps and other sites managed by prescription)
  - tree ferns will regenerate adequately on the site.
- Tree ferns and their associated biodiversity should be retained at the coupe and landscape levels in formal reserves (e.g., national parks and forest reserves), informal reserves (e.g. wildlife habitat strips and clumps) and areas subject to management prescriptions through the forest practices system (e.g. streamside reserves, relict rainforest).

- Forest Practices Officers will be responsible for ensuring that areas permitted for tree fern harvesting are indicated in forest practices plans and reserved areas are clearly defined and marked prior to harvesting in accordance with the *Forest Practices Code 2020*.
- Tree fern harvesting operations should be managed and monitored as prescribed in the certified forest practices plan. It is the responsibility of tree fern harvesters, generally through the land manager, to familiarise themselves with the forest practices plan prescriptions applying to any tree fern harvesting operation (e.g., extraction techniques, environmental care, location of boundaries of harvesting areas).
- Tree fern harvesting should be undertaken in a manner that protects or maintains other forest values (e.g. soils, biodiversity, forest health, water quality), recognising that in many cases the primary determinant of prescriptions and constraints in the harvest area will be the regulation of timber harvesting and reforestation activities.

6.4 Situations where tree fern harvesting may occur

Under this *Tree fern management plan*, commercial harvesting of tree ferns may only occur if prescribed in FPPs that cover forestry activities in the following situations:

- native forest to be converted to another land use
- native forest to be harvested and reforested
- existing softwood and hardwood plantations
- tree fern plantations or nursery sites.

These situations where tree fern harvesting will be permitted under this management plan are discussed in more detail below (6.4.1–6.4.4).

6.4.1 Native forest to be converted to another land use

Salvage harvesting of tree ferns will continue to be permitted from areas of native forest to be cleared for plantations, agriculture or infrastructure (e.g. dams, roads, powerlines, pipelines and other service facilities). This also includes areas cleared for roads, landings and primary snig tracks as part of timber harvesting operations.

6.4.2 Native forest to be harvested and regenerated

Silvicultural operations in wet eucalypt forest in Tasmania can cause significant disturbance to overstorey and understorey species (including tree ferns) in the timber harvesting area. This *Tree fern management plan* permits tree fern harvesting from areas of native forest which will be harvested and regenerated back to native forest, provided that the tree fern harvesting principles (6.3) apply. Operations may comprise of:

- Clearfell, burn and sow (using cable-logging equipment on steep terrain, or conventional timber harvesting equipment elsewhere).
- Aggregated retention, where patches of forest are retained from harvesting within the intensively harvested areas and tree fern harvesting can occur in the harvested fairways.

- Wet eucalypt forest under partial harvest regimes, undertaken in consultation with the FPA. (Note: It is assumed that the conditions of 6.3 will be met under a partial harvest regime, but FPA will be conducting research to confirm whether this assumption is met).

Tree fern harvesting in partial harvest operations is subject to additional constraints in some regions where *Dicksonia*-rich forest communities are uncommon (typically drier regions of the state) as noted below (7.0). An example is rainforest vegetation in the Freycinet and Midlands Bioregions and drier parts of Ben Lomond, Woolnorth and D'Entrecasteaux Bioregions, which have a conservation priority (See FPA *Forest Botany Manuals* for more information). Commercial tree fern harvesters have little interest in undertaking salvage harvesting from environments and forest types where *Dicksonia* is uncommon, and there may be some drier areas where *Dicksonia* is common and additional constraints do not apply.

6.4.3 Timber plantations

In some instances, established softwood and hardwood plantations contain populations of tree ferns that have either survived the plantation establishment process or have regenerated from spore. There are no restrictions on the harvesting of tree ferns in plantations other than the normal provisions of the *Forest Practices Code 2020*. Harvesting of tree ferns may be undertaken as a separate operation to the timber harvesting (e.g. harvesting tree ferns 'mid-rotation' may be safer and more efficient than integrating timber and tree fern harvesting operations).

6.4.4 Tree fern plantations or nursery sites

Tree fern plantations or nursery sites dedicated to the production of trunked tree ferns may be harvested in accordance with the provisions of the forest practices system. Tree fern harvesters should consult with an FPO and the FPA prior to the establishment or harvest of such sites.

6.5 Monitoring of tree fern harvesting

Prior to commencement of tree fern harvesting, FPOs must ensure that:

- areas designated for harvesting of tree ferns must be clearly demarcated
- all other relevant marking has been completed in the coupe
- tree fern harvesters receive an appropriate briefing on the FPP.

The FPO must undertake regular inspections of tree fern harvesting sites and report to the FPA any breaches or concerns about the application of the FPP or *Tree fern management plan*. At the completion of tree fern harvesting, the FPO will inspect the operational area and report to the FPA (through a certificate of compliance) on whether the operation is compliant with the conditions in the FPP.

The FPA undertakes random audits of FPPs and harvesting operations to assess the standards of FPPs and associated operations. Forest practices plans for tree fern harvesting are subject to such auditing and review.

Selective tree fern harvesting operations are assessed by the FPA to assess compliance with conditions of the FPP and *Tree fern management plan*. Findings assist in identifying research needs, to inform stakeholders, and where necessary to improve prescriptions in FPPs and subsequent *Tree fern management plans*.

6.6 Tree fern tags

Section 18B(1) of the *Forest Practices Act 1985* states:

> *A person must not, without the written approval of the Authority, trade in tree ferns unless a tag issued by the Authority is affixed to the stem of each tree fern.*

As per section 18B(4):

> **trade in tree ferns** *means to do one or more of the following:*
>
> *(a) collect, acquire or buy tree ferns;*
> *(b) barter or exchange tree ferns;*
> *(c) sell or agree to sell tree ferns;*
> *(d) offer, display or expose tree ferns for sale;*
> *(e) supply, send, forward, transport or deliver tree ferns for sale;*
> *(f) store or hold tree ferns;*
> *(g) authorise, direct, cause or permit a person to do a thing referred to in paragraph (a), (b), (c), (d), (e) or (f).*

All harvested tree ferns must have a Tasmanian tree fern tag securely attached at the point of harvest. Attachment of tags is the responsibility of the tree fern harvester, who must ensure that tags are attached to ferns before they are transported from the harvesting site (as specified in the FPP). Tree fern tags must remain attached throughout the retail chain to the end consumer.

Forest practices plans proposed for tree fern harvesting must have tree fern numbers estimated by the FPO, in order that an appropriate number of tree fern tags are issued to the tree fern harvester for that FPP area. Tree ferns are counted in sample plots located in different botanical communities within the FPP area, and then these numbers extrapolated to estimate the number of tree ferns in the FPP area. The methods for sample plot counts are covered in FPO training.

Tree fern harvesters must apply to the FPA for sufficient tree fern tags for the tree ferns to be harvested up to the estimated number, which is prescribed on the FPP coversheet. A copy of a certified FPP prescribing tree fern harvesting, along with a tree fern tag Request form (available from the FPO or FPA) and prescribed payment for the tree fern tags, must be supplied to the FPA in order for tree fern tags to be issued. Information required on the tree fern tag Request form includes the:

- unique FPP identification number for the area from which the tree ferns will be harvested
- number of tree ferns which the FPO estimates can be harvested
- name of certifying FPO
- name of the tree fern harvester and their current address
- business names, contact names and addresses for each other party in the supply chain
- date that compliance certification will be undertaken for the tree fern harvesting operational phase
- person responsible for arranging for the FPO to undertake checking, and signature of responsible person.

Issued tags must only be attached to tree ferns harvested from the area covered by the FPP against which the tags were obtained. Any tags that may be left over from a particular FPP area must either be transferred to another FPP (via a tree fern tag request form) or returned to the FPA for a refund.

Tree fern tags are issued sequentially for each FPP and will not exceed the prescribed number of tree ferns identified on the FPP. Once the FPA has received a request for tags and clears payment, the required number of tags are provided to the tree fern harvester. Tags are issued under section 18A(b) of the *Forest Practices Act 1985* and can be obtained for two size classes of fern:

1) tree fern stem greater than 30 cm in length (priced at one fee unit or $1.70 as of 1 July 2022)

2) tree fern stem 30 cm or less in length (priced at 0.5 fee units or 85c as of 1 July 2022).

The pricing of tags is adjusted annually by the Tasmanian Treasury.

Proceeds from the sale of the tags pay for:

- administration of the tree fern management system
- database and record keeping
- monitoring and enforcement
- research into sustainable management of tree ferns in Tasmania.

Tree fern tags are printed on strong waterproof material with sequential numbers. This enables suitable monitoring, recording and reporting and minimises the risk of tags being re-used. The colour of tags is also changed regularly to prevent re-use or copying. The format of the tags is reviewed regularly to ensure that the information is appropriate and the material and method of attachment is suitable.

Table 3 - Summary of the regulatory system for tree fern harvesting in Tasmania under this *Tree fern management plan*

Type of tree fern harvesting	Source of tree ferns	Forestry operation	Conditions for tree fern harvesting	FPA notification required	FPP required	Tree fern tags required	Compliance report required
Commercial	Native forest	Native forest to be converted or cleared	As per harvesting prescriptions	Yes, prior to harvesting	Yes	Yes	Yes
Commercial	Native forest	Native forest to be regenerated	Consultation with FPA prior to harvesting	Yes, prior to harvesting	Yes	Yes	Yes
Commercial	Existing timber plantations	Future harvesting of plantation timber	Consultation with FPA prior to harvesting	Yes, prior to harvesting	Yes	Yes	Yes
Commercial	Tree fern plantations or nursery sites	Tree fern harvesting	Consultation with FPA prior to establishment and harvesting	Yes, prior to harvesting	Yes	Yes	Yes
Non-commercial	Native forest or other	None	Six or less ferns harvested for non-commercial purposes*	No	No	No	No

*Consult the *Forest Practices Regulations 2017* for clarification.

6.7 Legislation and penalties

Under the terms of the *Forest Practices Act 1985,* the FPA may certify, refuse to certify, vary or revoke a FPP. The FPA may direct persons to comply with the *Forest Practices Code 2020* and make good any breach or environmental harm. Alternatively, the FPA may fine or prosecute any person who does not comply with the Act or provisions of a FPP. Thus the FPA has considerable powers under the Act to control tree fern harvesting to ensure that such harvesting meets the objectives of this *Tree fern management plan*.

The harvesting of tree ferns or possession of untagged ferns outside an approved harvest area is a contravention of the *Forest Practices Act 1985* and can attract substantial fines. The harvesting situations, requirements and constraints for tree fern harvesting are summarised in Table 3.

7. Threats to the conservation status of tree ferns

Dicksonia antarctica is a common and widespread species throughout Tasmania and is not at risk from any current or future management activities. It is not listed as threatened under the Tasmanian *Threatened Species Protection Act 1995* or *Environment Protection and Biodiversity Conservation Act 1999*. *Dicksonia antarctica* is not listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for restrictions on trade from Australia.

Dicksonia occurs in most National Parks throughout the state, as well as in numerous state and other reserves. Additional formal and informal reservation of some forest communities containing *Dicksonia* has occurred or will continue to occur, as a result of policy requirements (e.g. Tasmanian RFA and *Tasmanian Community Forest Agreement*) and provisions of the *Forest Practices Code 2020*. Such reservation will also result in the protection of other species of tree ferns.

The security of formal reserves in Tasmania is high. All formal reserves, including National Parks, state reserves, game reserves, nature reserves and forest reserves, are equivalent to IUCN Protected Area Management Categories I, II, III IV, or VI as defined by the IUCN Commission for National Parks and Protected Areas 1994. The status of formal reserves is secure, requiring approval by the Tasmanian Parliament for dedication or revocation.

Only a small proportion of the Tasmanian population of *Dicksonia* is available for commercial harvesting. Harvesting of *Dicksonia* is effectively restricted to parts of the state where the species is common, and where the species will be maintained at a landscape level. There are practical reasons for this:

- Most wet forest communities often have a relatively high density of *Dicksonia*. Such forests are well represented in formal and informal reserves (e.g. streamside reserves) and other sites generally unavailable for timber harvesting (e.g. steep shaded slopes).
- The Tasmanian RFA and subsequent policies preclude forestry operations in several forest communities on public land and in some instances preclude their conversion on private land. These include wet forest communities (e.g. *Eucalyptus brookeriana* forest, *E. viminalis* wet forest) that often contain large populations of *Dicksonia*.

- There are additional constraints through the Tasmanian forest practices system, on operations in some *Dicksonia*-rich forest communities in regions where such communities are uncommon (typically drier regions of the state). An example is rainforest vegetation in the Freycinet and Midlands Bioregions and drier parts of Ben Lomond, Woolnorth and D'Entrecasteaux Bioregions, which have a conservation priority (See FPA *Forest Botany Manuals* for more information).
- Commercial tree fern harvesters have little interest in undertaking salvage harvesting from environments and forest types where *Dicksonia* is uncommon.

This *Tree fern management plan* will not result in a change in the conservation status of *Dicksonia* at national, state or regional levels.

8. Issues relating to the conservation and harvesting of tree ferns

8.1 Environmental

The sustainable harvesting of tree ferns from native forest, as described in this *Tree fern management plan*, will have a negligible impact on the environment or ecology of a particular area, relative to the ecological changes resulting from the timber harvesting and regeneration practices. The retention of tree ferns in formal and informal reserves ensures that ecological values are maintained in the vicinity of operational areas and at the landscape level. This also ensures that there is adequate potential for the re-colonisation of the regenerating forest by tree ferns and associated epiphytes.

The current regulatory system, including requirements for the preparation of FPPs and the tree fern tagging system, ensure that appropriate harvesting constraints are prescribed and monitored in FPP areas. This severely limits the potential for illegal harvesting activities or availability of untagged ferns in the marketplace.

8.2 Social

The harvesting of tree ferns from native forest is a sustainable practice which supports employment in an export-oriented business sector, improves resource use and reduces the incentive for illegal harvesting from other areas with high conservation value. Application of previous *Tree fern management plan*s has significantly reduced illegal harvesting of the species, and placed the industry on a regulated footing. This has translated into market acceptability for the product.

The harvesting of tree ferns provides full-time and part-time employment in rural and regional areas. Whilst the number of people employed in this industry is relatively small, it is significant for the individuals concerned, their families and the community as a whole. Such employment can be important in rural areas with restricted alternative employment opportunities.

8.3 Economic

The vast majority of FPPs currently prepared are not within forest areas suitable for the harvesting of tree ferns due to legislative restrictions, absence or few tree ferns present, or logistical/economic issues that make tree fern harvesting unviable. In many coupes, time and safety constraints mean that only a fraction of the total available ferns are removed.

The tree fern industry faces the normal supply and demand risks associated with any economic enterprise. However, the rapid phasing out of the only current source of

supply will lead to a collapse in the industry. This will result in the loss of regional employment opportunities, unless alternative sources of tree ferns can be sustainably utilised in accordance with this *Tree fern management plan*.

8.4 Political

Currently, each state with tree fern harvesting or distribution operations has its own *Tree fern management plan* and regulations. The inconsistencies between approaches threaten some operations due to differences in regulatory costs and compliance regimes. Implementation of a national approach to tree fern harvesting, using the draft *National tree fern harvesting guidelines* as a basis, would result in a more consistent approach to tree fern management in the different jurisdictions.

The primary source of tree ferns was previously through conversion of native forest to plantation. Under the Tasmanian *Permanent Native Forest Estate Policy* 2017 the broad scale clearance and conversion[1] of native forest on public or private land is not permitted.

9. Monitoring of management plan implementation

9.1 Harvesting operations and retail outlets

Since the inception of the 2001 *Tree fern management plan*, auditing and nursery inspections undertaken by the FPA as revealed a decrease in illegally harvested tree ferns in the marketplace. However, there are still infrequent, minor instances of non-compliance and illegal activity despite the efforts made to educate all stakeholders on the requirements for management and legal trading of tree ferns. Therefore, continuation of monitoring and education is required. The following monitoring will be undertaken:

- Checks of tree fern harvesting operations by FPOs as part of normal FPP implementation and inspections, to ensure that tree fern harvesting complies with conditions in the FPP.
- Spot checks of tree fern harvesting operations by FPA staff; this will show that the FPA is active and can also perform an educational role.
- FPOs will inspect the FPP area at completion of tree fern harvesting, as part of the compliance checking (prior to issuing of a certificate of compliance).
- FPA auditing of a representative sample of FPPs each year (as part of reporting requirements to the Tasmanian parliament).
- Spot checks of nurseries and retail outlets by the FPA to check that required tagging procedures are being followed.
- Tree fern harvesters are required to keep records of the tree fern tag numbers and the names and addresses of retail outlets that are supplied with tree ferns. Under the *Forest Practices Act 1985*, an FPO can request that this information be provided by anyone trading in tree ferns.

[1] Broad scale clearance and conversion means clearance and conversion of more than 20 hectares of native forest in any period of five consecutive years (based on calendar years) per property as defined in the Tasmanian *Permanent Native Forest Estate Policy* 2017.

10. Biosecurity regulations for exporting tree ferns

Information on biosecurity for export of tree ferns is only included in this management plan to inform tree fern harvesters/exporters of their legislative responsibilities under other regulatory systems. Jurisdictional responsibilities in relation to biosecurity and imports/exports, matters associated with native species genetic purity and the like are a matter for the environmental and/or biosecurity agencies of those receiving jurisdictions (both interstate and internationally). It is the responsibility of the exporter to check and comply with the conditions of entry of the importing State, Territory or country

10.1 Domestic export of tree ferns

Each State and Territory sets its own import requirements for the import of plants and plant products from other supplying jurisdictions. Generally, import requirements are based on a risk assessment which considers the likelihood of entry, establishment and spread of pests and diseases as well as the potential consequences of pest and disease entry. Appropriate risk mitigation measures are only imposed where the risk assessment justifies them and import conditions must be least trade restrictive.

Moving plants interstate may require certification that they are free of weeds, diseases and pests. Across Australia this is usually through a Plant Health Certificate, but can also be via a Plant Health Assurance Certificate or a BioSecure HACCP Biosecurity Certificate.

Authorised Inspectors can certify that plants and plant products are compliant with another jurisdiction's import requirements. In Australia there is also an Interstate Certification Assurance Scheme (ICA Scheme) which enables accredited businesses to certify their own products for export using a Plant Health Assurance Certificate. Whilst Tasmania accepts and endorses the ICA Scheme, there are currently no Tasmanian businesses accredited under it for export into the domestic market. While there is no ICA Scheme operating procedure specifically relating to the movement of tree ferns, there are generic procedures relating to the movement of plants which may be utilised by some States and Territories.

10.2 International export of tree ferns

According to data obtained from the FPA's tree fern database the majority of Tasmanian tree ferns are either shipped to mainland Australia or exported overseas directly.

To export internationally tree ferns which were harvested under this management plan a commercial Wildlife Trade Permit is required under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), for which the Department of Climate Change, Energy, the Environment and Water (DCCEEW) is responsible. These permits are issued by DCCEEW.

Under the *Export Control Act 2020* for which the Department of Agriculture, Fisheries and Forestry (DAFF) is responsible, the export of tree ferns may require inspection for compliance and certification by an accredited Plant Export Authorised Officer before they can be exported. The rules for international export of tree ferns are set out in DAFF's *Export Control (Plants and Plant Products) Rules 2021.*

For some countries the international export of tree ferns requires a phytosanitary (plant health) certificate to be issued by DAFF Biosecurity Plant Division prior to export. A phytosanitary certificate can only be issued by DAFF if it is required by the importing

country. Attention should be paid to phytosanitary requirements for pests and diseases and movement of plants with soil – this needs to be considered by harvesters and exporters at the harvesting stage, when tree ferns are in storage and (particularly) in fumigation or other treatments prior to export in containers. For more information on the *Export Control Act 2020* contact DAFF.

11. Liaison and education of stakeholders

The review and implementation of the *Tree fern management plan* should involve liaison with and education of stakeholders. The following commitments have been adapted from the draft National Tree fern Harvesting Guidelines:

- The FPA will produce technical information on tree ferns including regulation of tree fern harvesting. These will be provided to harvesters, industry associations, retailers and other stakeholders.
- Regular liaison will occur between various stakeholders (FPA, NRE Tas, DCCEEW, land managers, tree fern harvesters and retailers) to ensure that the regulations for tree fern harvesting and trading in Tasmania are understood, implemented and reviewed as appropriate. In addition to this, regular sharing of information will occur between stakeholders on tree fern harvesting, trading and exports.
- Development of an industry association will be encouraged to facilitate good harvesting practices, good storage and quarantine practices, and appropriate policy development to maintain a viable and sustainable industry.

12. Evaluation of performance under this management plan

The following evaluation of performance will be undertaken against the management plan.

- Feedback from landowners/managers, tree fern harvesters and other stakeholders will provide a means of adaptive management working within the constraints of this *Tree fern management plan* to improve the process.
- Areas where tree fern harvesting has taken place will be monitored by FPOs for compliance with the FPP. Examination of harvest areas also provides a means of assessing the application of management prescriptions. This provides another means of applying the adaptive management principle based on actual experiences.
- The checking of harvest returns by harvesters to the landowner/manager against the number of tree fern tags issued by the FPA will be an indicator of compliance.
- The exclusion of tree fern harvesting from reserves or areas excluded by prescription represents compliance with this *Tree fern management plan* at the coupe level. This can be applied to the broader environment to ascertain levels of illegal harvesting.
- Long-term monitoring of regenerated native forest sites where tree fern harvesting has taken place will provide an assessment of the survival and regeneration of tree ferns and the maintenance of the species relative to the management prescriptions applied.

- Research examining the sustainable management of tree ferns will continue and the results of this work will be delivered to stakeholders and integrated into future reviews of the *Tree fern management plan*. This may also serve to provide information for adaptive management during the life of the *Tree fern management plan*.
- The FPA will continue to deliver information on tree fern management to stakeholders. The success of this information delivery will be reflected in particular by nursery and harvester knowledge and public enquiries about tree ferns.

13. Reporting of management plan implementation

The FPA will report on the implementation of this *Tree fern management plan* to the Tasmanian Parliament and to the Australian Government through its Annual Report, as required under s.4X of the *Forest Practices Act 1985*. Annual reports will include details on the:

- number of FPPs that include tree fern harvesting
- number of tree fern tags issued
- monitoring and investigations of tree fern harvesting compliance
- research projects and outcomes.

14. Review of the management plan

This management plan shall remain in force for a maximum period of five years or until amended or replaced by a plan approved by the Tasmanian and Australian Governments prior to this. Review of the management plan will include consultation with stakeholders. Future tree fern research priorities are detailed in Appendix 2. This research provides important information to improve the effectiveness and sustainability of tree fern management in Tasmanian forests, and to integrate such information and procedures into future revisions of the Tasmanian *Tree fern management plan*.

15. References

Araujo, MB and Townsend-Peterson, A 2012, 'Uses and misuses of bioclimatic envelope modelling', *Ecology* 93, 1527–1539.

Baker TP, Jordan GJ, Dalton PJ, Baker SC 2013. 'Impact of distance to mature forest on the recolonisation of bryophytes in a regenerating Tasmanian wet eucalypt forest', *Australian Journal of Botany* 61, 633-42.

Chuter, A 2003, *Regeneration of* Dicksonia antarctica *after logging*, unpublished Honours thesis, University of Tasmania, Hobart, Tasmania.

Commonwealth of Australia and State of Tasmania 1997, *Tasmanian Regional Forest Agreement*, Department of Agriculture, Fisheries and Forestry, Canberra, ACT.

Donoghue, S and Turner, P 2021 'A review of Australian tree fern ecology in forest communities', *Austral Ecology* 47, 145—165.

Duck, C 2017, *The influence of disturbance history on tree fern dynamics in Tasmania and Victoria: implications for epiphyte and plant diversity*, unpublished Masters thesis, University of Melbourne, Melbourne, Victoria.

Duck, C, Nitschke C, and Turner, PAM 2018, 'How do tree ferns and their associated plant biodiversity fare over time after aggregated retention/CBS harvesting and wildfire?', *Forest Practices News,* 14(1), pp. 16.

Duncan, BD and Isaac, G 1986, *Ferns and allied plants of Victoria, Tasmania and South Australia*, Melbourne University Press in association with Monash University, Melbourne, Victoria.

Duncan, F, and Neyland, M 1986, 'Tasmanian tree ferns: a vegetative key and descriptions', *The Tasmanian Naturalist* 85, 2–8.

Elith, J, Phillips, SJ, Hastie, T, Dudik, M, Chee, YE and Yates, CJ 2011, 'A statistical explanation of MaxEnt for ecologists', *Diversity and Distributions* 17, 43–57.

Forest Practices Authority 2012, *Tree fern management plan for the harvesting, transporting or trading of* Dicksonia antarctica *in Tasmania*, Forest Practices Authority, Hobart, Tasmania.

Forest Practices Authority 2005, *Tree fern management plan for the harvesting, transporting or trading of* Dicksonia antarctica *in Tasmania*, Forest Practices Authority, Hobart, Tasmania.

Forest Practices Authority 2020, Threatened Flora Habitat Suitability Models, *Flora Technical Note No. 13*. Forest Practices Authority, Hobart.

Forest Practices Board 2001, *Tree fern management plan for the harvesting, transporting or trading of* Dicksonia antarctica *in Tasmania*, Forest Practices Board, Hobart, Tasmania.

Forestry Commission Tasmania 1989, *Tree fern management plan*, Forestry Commission Tasmania, Tasmania.

Fox, JC and Turner, PAM 2004, Chapter 6. *Veined bristle-fern* (Crepidomanes venosum). In: *Linking landscape ecology management to population viability analysis. Report 2: Population viability analyses for eleven forest dependent species*. A project by the University of Melbourne prepared for Forestry Tasmania. pp 137–151.

Garrett, M 1996, *The ferns of Tasmania: their ecology and distribution*, Tasmanian Forest Research Council, Hobart, Tasmania.

Jones, DL, and Clemesha, SCC 1977, *Australian ferns and fern allies*, AH & AW Reed Pty Ltd., Sydney, NSW.

Kirkpatick, J and Moscal, A 1987, *Conservation status of the vegetation and flora of the Lemonthyme area, Tasmania – a report to the Australian Heritage Commission*, University of Tasmania, Hobart, Tasmania.

Kitchener, A and Harris, S 2013, Glossary, abbreviations and appendices, *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation*, Edition 2, Department of Primary Industries, Parks, Water and Environment, Tasmania.

Mueck SG, Ough K and Banks JC 1996. 'How old are wet forest understoreys?', *Australian Journal of Ecology* 21, 345–8.

National Flora Network 2006, *National tree fern harvesting guidelines*, unpublished.

Neyland, MG 1986, *Conservation and Management of Tree ferns in Tasmania*, Wildlife Division Technical Report 86/1, National Parks and Wildlife Service Tasmania, Tasmania.

Neyland, M 1991, *Relict Rainforest in Eastern Tasmania,* Tasmanian NRCP Technical Report No. 6, Wildlife and Heritage and Department of the Art, Sport, the Environment, Tourism and Territories, Canberra, ACT.

Ough, K, and Murphy, A 1996, 'The effect of clearfell logging on tree-ferns in Victorian wet forest', *Australian Forestry* 59,178–188.

Pannell, JR, 1992, *Swamp forests of Tasmania*, Forestry Commission, Tasmania.

Peacock, R, and Duncan, F 1995, *Effects of logging on manferns (*Dicksonia antarctica*) and epiphytes*, Division of Silviculture Research and Development Annual Report 1994–95, Forestry Tasmania, Tasmania.

Roberts, N 2002, *Tree ferns as a substrate for bryophytes and ferns in south-eastern Tasmania*, unpublished Honours thesis, University of Tasmania, Hobart, Tasmania.

Roberts NR, Dalton PJ, Jordan GJ 2005, 'Epiphytic ferns and bryophytes of Tasmanian tree-ferns: A comparison of diversity and composition between two host species', *Austral Ecology* 30, 146–154.

Turner, PAM 2003, *The ecology and conservation of bryophytes in Tasmanian wet eucalypt forest*, PhD thesis, University of Tasmania, Hobart, Tasmania.

Van Galen LG, Baker SC, Dalton PJ and Jordan G 2016, 'The effectiveness of streamside versus upslope reserves in conserving log-associated bryophytes of native production forests', *Forest Ecology and Management* 373, 66–73.

Appendix 1: Background information on Tasmanian tree ferns

Characteristics of Tasmanian tree ferns

There are five Tasmanian fern species that regularly form trunks over one metre in height and that are referred to as tree ferns. These species are: *Dicksonia antarctica* Labill. (manfern or soft tree fern), *Cyathea australis* (R. Br.) Domin (rough tree fern), *Cyathea cunninghamii* Hook. f. (slender tree fern), *Cyathea* X*marcescens* Wakefield (skirted tree fern) and *Todea barbara* (L.) T. Moore (king fern). *Cyathea* X*marcescens* is a natural hybrid between *C. cunninghamii* and *C. australis*. Four other species of fern [*Polystichum proliferum* (R. Br.) Presl, *Blechnum nudum* (Labill.) Mett. ex Luerss, *Diplazium australe* (R. Br.) Wakefield and *Pneumatopteris pennigera* (G. Forst.) Holttum] may also form trunks, but these rarely exceed 30 cm in height.

Tree ferns are an integral part of the ecology of Tasmanian wet forests. They often dominate the understorey and help to create a sheltered and moist forest floor, providing ideal habitat for many non-vascular plants and invertebrate animals. *Dicksonia* trunks are formed by persistent frond bases and layers of aerial roots that connect the crown to the ground. These trunks offer a substrate for epiphytes such as mosses and filmy ferns, and a nursery site for the germination of many species.

The harvesting of tree ferns in Tasmania is limited to *Dicksonia.* The inclusion of a description of the other tree ferns is solely for identification purposes and understanding the distribution and ecology of these ferns.

The following key will assist identification based on characters of the frond. It is important to examine the base of the stipe (the basal part of the frond).

Key to Tasmanian tree ferns (adapted from Duncan and Neyland 1986)

❶ Stipe smooth near base
- ❷ Stipe base hairless ..... *Todea barbara*
- ❷ Stipe base covered with soft reddish hairs ..... *Dicksonia antarctica*

❶ Stipe rough and rasp-like near base
- ❷ Trunk of mature plant more than 20 cm diameter; scales at base of stipe varnished
  - ❸ Stipe base brown; scales brown ..... *Cyathea australis*
  - ❸ Stipe base black; scales dark brown ..... *Cyathea marcescens*❖
- ❷ Trunk of mature plant less than 20 cm diameter; scales at base of stipe often streaked (stipe base black; scales fawn to brown) ..... *Cyathea cunninghamii*
- ❷ Trunk of mature plant absent or not determined
  - ❸ Most pinnules joined to rhachis; scales at base of stipe varnished
    - ❹ Stipe base brown; scales brown ..... *Cyathea australis*
    - ❹ Stipe base black; scales dark brown ..... *Cyathea marcescens*❖
  - ❸ Most pinnules petiolate; scales at base of stipe often streaked (stipe base black; scales fawn to brown) ..... *Cyathea cunninghamii*

**Cyathea marcescens* will only be found where both *C. australis* and *C. cunninghamii* co-occur. This hybrid is more correctly written as *Cyathea* X*marcescens.*

General information pertaining to the Tasmanian tree ferns not prescribed for harvest under the Tasmanian *Tree fern management plan* is presented below. The Tasmanian distribution of these species (and *Dicksonia*) is represented in Figure A. None of the five species of Tasmanian tree ferns are restricted to the state of Tasmania. *Cyathea australis*

is found in each of the eastern mainland states. *Cyathea cunninghamii* is found in each of the eastern mainland states and in New Zealand. *Cyathea* X*marcescens* occurs in Victoria. *Dicksonia antarctica* is found in each of the eastern mainland states and in South Australia (where it may be extinct in the wild). *Todea barbara* is found in all the mainland states except Western Australia, as well as in New Zealand and South Africa.

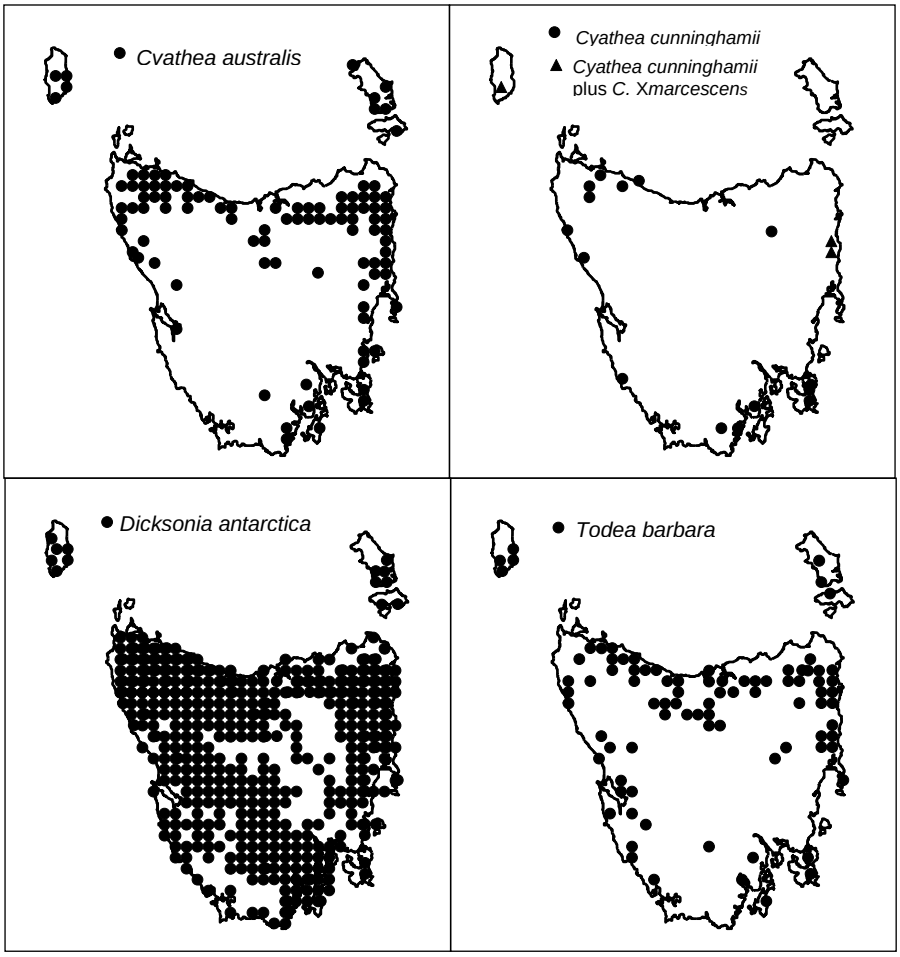


Figure A: Distribution of tree fern species in Tasmania (taken from Garrett 1996).

Cyathea australis occurs at low altitudes (0–500 m) throughout northern and eastern Tasmania. It is also found at a few scattered locations along the West Coast. The species is common but not abundant. It mainly occurs in wet eucalypt forest, extending to rainforest margins and dry sclerophyll forest. *Cyathea australis* prefers fertile, well-drained sites. It responds well to site disturbance and its clustered distribution is often a relic of past disturbance. The species is more tolerant of full sunlight than *Dicksonia*, although the two species often occur together. *Cyathea australis* is tolerant of fire. The species is unsuited to harvesting due to its relative inability to establish adventitious roots.

Cyathea cunninghamii mainly occurs at low altitudes (0–150 m) and is known from less than twenty sites around Tasmania, mainly in coastal and hinterland areas. The species is uncommon. It occurs in mixed forest (*Eucalyptus obliqua/E. regnans* overstorey with a callidendrous rainforest understorey) and in gallery scrub. *Cyathea cunninghamii* is found only at sites that have apparently been protected from fire, alongside permanently flowing streams. *Cyathea cunninghamii* is listed as an endangered species on the Tasmanian *Threatened Species Protection Act 1995.*

Cyathea X*marcescens* is known from only three locations in Tasmania, with few plants at these sites. The species occurs alongside *C. australis* and *C. cunninghamii* and is recognised as a hybrid between them. *Cyathea* X*marcescens* appears to have similar ecological requirements to *C. cunninghamii*. *Cyathea* X*marcescens* is listed as a vulnerable species on the *Tasmanian Threatened Species Protection Act 1995.*

Todea barbara is largely restricted to the rivers and creeks of Tasmania's coastal and hinterland regions, reaching its best development in the north-east of the state. The species is common but not abundant. *Todea barbara* is found on infertile soils, apparently being unable to compete with the other species of tree fern on more fertile sites. The species is typically found growing adjacent to watercourses that contain running water for at least part of the year.

Species distribution models for Tasmanian tree ferns

(Text adapted from Forest Practices Authority, 2020).

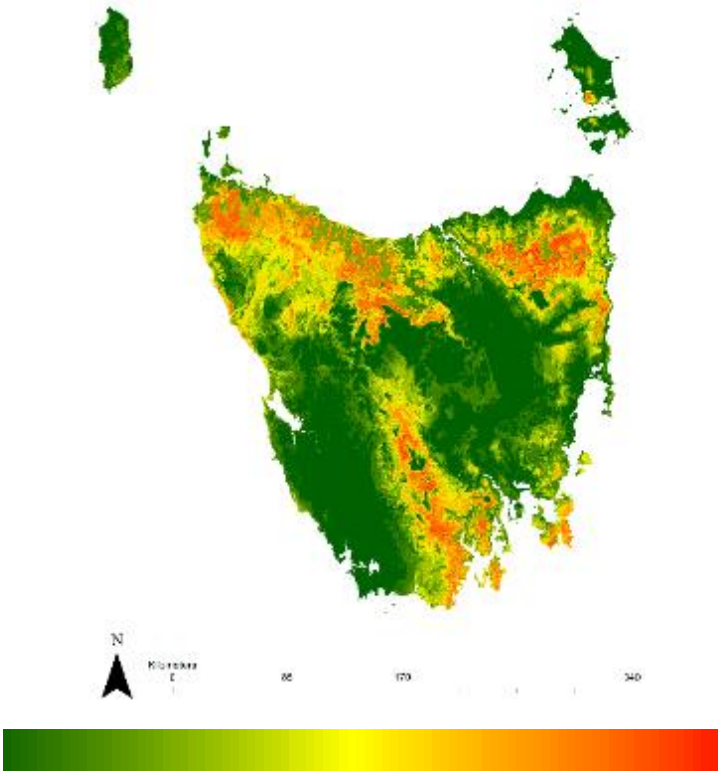
Species distribution models (SDMs) have been developed for all five Tasmanian tree fern species. SDMs are useful tools for estimating the probability that a species will occur in a location using associations between environmental variables and known presence records of species across locations and habitats of interest (Araujo and Peterson, 2012).

Maximum entropy modelling (MaxEnt), a software program which estimates the relationship between species records at sites and the environmental and spatial characteristics of those sites (Elith, et al. 2011), was used to prepare the tree fern SDMs. The software estimated the relationship between known tree fern records and environmental variables across each 100 m^2 grid cell with the resultant model output a relative probability of occurrence measure for each cell for each of the five tree fern species. The results of these models are displayed in figures B-F.

The five tree fern species models were modelled using TASVEG (4.0), geology type (250k), elevation and eight bioclimatic variables. The full methodology for preparing these models, including which environmental variables were used, is outlined in Forest Practices Authority (2020). Table A lists the top three environmental variables that most influence the distribution for each species according to each model. These models can be used to visualise the probability that tree ferns will occur in a given location or support habitat for tree ferns.

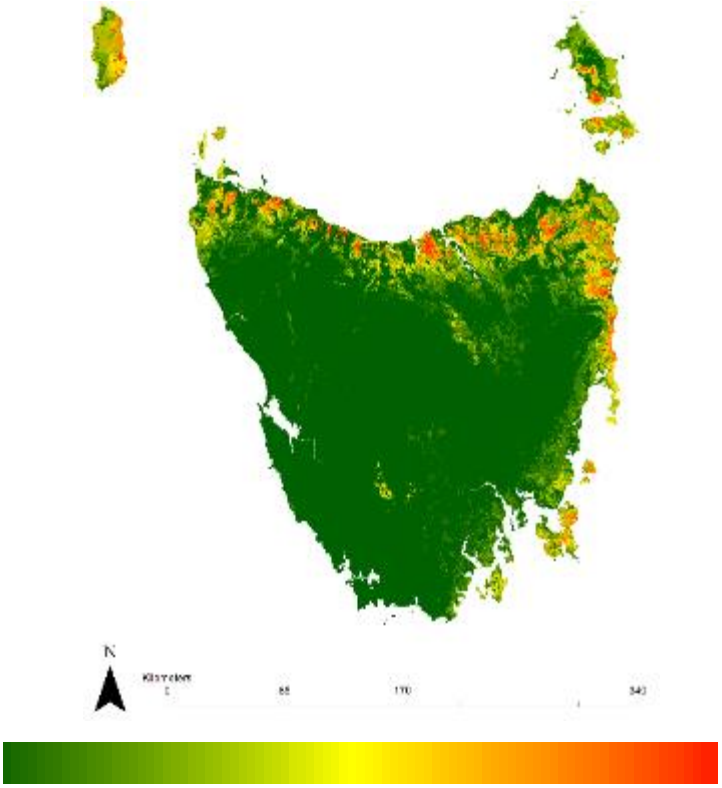
Table A - Environmental factors which influence the modelled distributions of Tasmanian tree fern species

Species	Environmental variables with the greatest influence on the model (percentage)
Dicksonia antarctica	Annual precipitation 29%, annual mean radiation 28%, TASVEG 24%
Cyathea australis	Annual mean temperature 31%, TASVEG 24%, annual mean radiation 18%
Cyathea cunninghamii	Radiation seasonality 29%, TASVEG 26%, geology type 15%
Cyathea Xmarcescens	Geology 42%, radiation seasonality 38%, TASVEG 13%
Todea barbara	Geology 37%, elevation 24%, TASVEG 19%



Very low probability of occurrence **Very high probability of occurrence**

Figure B: Species distribution model for *Dicksonia antarctica*, showing the probability that a location will contain the species.



Very low probability of occurrence **Very high probability of occurrence**

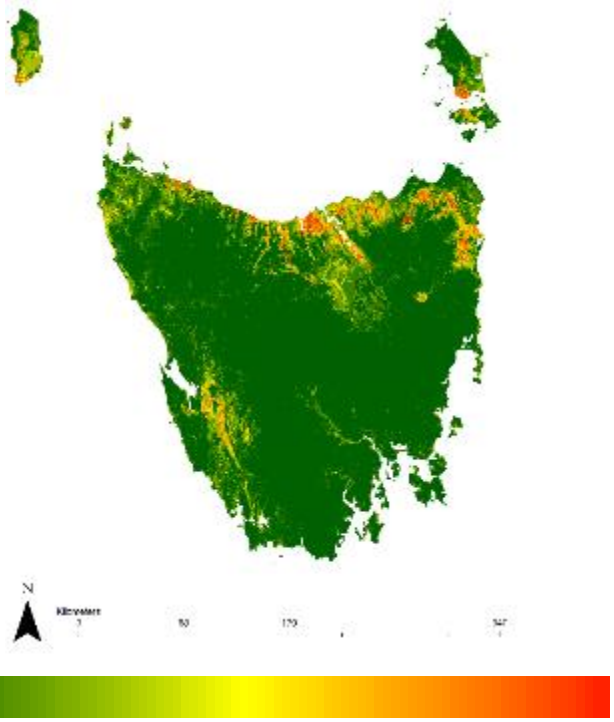
Figure C: Species distribution model for *Cyathea australis*, showing the probability that a location will contain the species.

Very low probability of occurrence

Figure D: Species distribution model for *Cyathea cunninghamii*, showing the probability that a location will contain the species.

Very high probability of occurrence

Figure E: Species distribution model for *Cyathea Xmarcescens*, showing the probability that a location will contain the species.



Very low probability of occurrence **Very high probability of occurrence**

Figure F: Species distribution model for *Todea barabara*, showing the probability that a location will contain the species.

Life cycle of *Dicksonia antarctica*

The tree fern life cycle for *Dicksonia* and the other species of Tasmanian tree ferns is well understood in terms of the sequence of four development stages. The sequence of developmental stages described below has been taken from Neyland (1986).

In the first stage of tree fern development the spores germinate to produce a small structure called the prothallus. After a few weeks the prothallus produces male and female organs. In the presence of water the male organs (antheridia) release sperm cells that fertilise ova within the female organs (archegonia). Dehydration of the prothallus stops this process.

The second stage of development is known as the early sporophyte stage. The fertilised ova (zygotes) develop into miniature ferns that are parasitic on the prothallus until they develop their own chlorophyll and root system. The early sporophyte stage lasts for up to two years, during which time the fronds get progressively larger. During this stage the plants are highly susceptible to inadequate moisture and to either inadequate or excessive light.

The third stage of development is known as the rosette stage. During this stage, lasting for one or two years, the root system develops more fully and the base of the trunk forms.

The fourth stage of development involves the development of the trunk into the familiar tree fern. This stage is thought to commence between four and six years after spore germination. The rate of height growth depends on site conditions. *Dicksonia* has been estimated to grow at between 3.5 and 5.0 centimetres in height per year on average.

Reproduction occurs for the first time at an average age of 23 years. Spore production in all five species is prolific, occurring mainly in late summer. Distribution of the five species is not limited by spore dispersal so much as by the effects of environment conditions on the first two stages of tree fern development. One of these environmental conditions is the proximity of other tree ferns, evidenced by the fact that young tree ferns developing beneath the crowns of larger specimens are unlikely to grow to maturity.

Dicksonia is tolerant of fire and re-shoots readily following burning. When the top part of a plant is cut off, the lower part dies, but the top has a vigorous ability to produce adventitious roots and to resume growth, especially if the mature fronds are pruned.

Epiphytes and *Dicksonia antarctica*

The trunk of *Dicksonia* is particularly dense and fibrous compared to other tree fern species and is excellent at holding moisture. *Dicksonia* can host a high diversity of epiphytic species. Most epiphytes are bryophytes (mosses and liverworts) and ferns, but lichens are also frequent. Some of these epiphytic species show strong preferences for *Dicksonia* trunks over other available substrates. A recent study into ferns and bryophytes occurring on *Dicksonia* trunks recorded 101 different species across just ten study sites in southeastern Tasmania (Roberts, 2002). This is a remarkably high diversity to be associated with a single host species.

While it is clear that *Dicksonia* trunks offer habitat to many species, variation in epiphytic diversity and composition from site to site suggests the ecological importance of the host is variable. Thus, the conservation value of *Dicksonia* may be greater at some sites than others – depending on how many species are using it as habitat, and whether or not it is supporting rare species. There is a complex range of factors underlying

variation in epiphytic diversity, many of which are connected with microclimate or disturbance history.

Epiphytes tend to be sensitive to subtle microclimatic factors, such as humidity. This can be seen from the preference of individual species for a certain height on the trunk. Changes to microclimatic conditions, such as increased light, wind or aspect, are likely to have a great impact on the suitability of *Dicksonia* trunks as habitat.

Age of trunks and the length of time since disturbance will also influence the diversity and composition of epiphytes on *Dicksonia.* The oldest and least disturbed trunks are more likely to support late-colonising epiphytic species, and therefore may have higher conservation value. The age and extent of the dominant vegetation is also an important factor, as it influences microclimatic conditions (e.g. wind and light).

Ecology and distribution of *Dicksonia antarctica*

Dicksonia has a broad distribution range across southeastern Australia with natural populations occurring in Tasmania, Victoria, New South Wales and Queensland. It had a very restricted distribution in South Australia and is now possibly extinct in the wild (Duncan and Isaac 1986, Jones and Clemesha 1977).

In Tasmania, *Dicksonia* is the most common tree fern and is a member of a wide range of plant communities. The altitudinal range for *Dicksonia* is from sea level to 1000 metres. It has been reported to prefer fertile soils, requiring regular moisture and a degree of shading (Neyland 1986). The species becomes uncommon when the canopy is dense and reaches its best development in wet gullies and forests where the canopy is partly broken (Neyland 1986).

The distribution and population size of *Dicksonia* is very much restricted by annual rainfall (see Table B).

Table B: Tasmanian distribution of *Dicksonia* based on rainfall (from Neyland 1986).

Average rainfall (mm/year)	**Distribution of *Dicksonia antarctica***
<600	Populations are rare, generally found in isolated stands of a few plants occurring only in the most sheltered sites.
600 – 750	Largely restricted to deeply incised south facing gullies.
750 – 1000	Restricted to moist gullies and sheltered southerly slopes.
>1000	Common where rainfall and other site factors (e.g. soil fertility) are favourable.

Forestry Tasmania estimated the Tasmanian population of trunked *Dicksonia* (i.e. specimens with established trunks) for their 1989 *Tree fern management plan*. The estimate was based on limited sampling of *Dicksonia* in some favoured forest communities, then extrapolation to determined state totals using 1984 vegetation mapping (Kirkpatrick and Dickenson 1984). This estimate was re-assessed in 2001 using forest communities identified under the Tasmanian *Regional Forest Agreement 1997* (RFA). The 2001 assessment estimated that there were approximately 63 million trunked *Dicksonia* in Tasmania. This was considered to be an under-estimate of the number of trunked *Dicksonia* in the state.

For the purposes of the 2007 revision of the *Tree fern management plan*, the number of trunked *Dicksonia* in Tasmania was re-estimated with the assistance of Forestry

Tasmania's Conservation Planning section. This process was undertaken due to the availability of new research data on *Dicksonia* numbers and advances in GIS mapping capabilities. The process of re-estimating the number of trunked *Dicksonia* in Tasmania was undertaken in three stages:

- identification of RFA forest communities known to be favoured *Dicksonia* habitat and calculation of the extent of these communities using GIS and mapping tools
- review of past research and surveys of *Dicksonia* habitat to estimate density of trunked *Dicksonia* for these forest communities
- *Dicksonia* numbers were generated using the density estimates multiplied by the extent of that forest community mapped for the state.

The determination of suitable *Dicksonia* habitat was initially identified via personal communication with the FPA's Senior Botanist, Fred Duncan, and Forestry Tasmania's Principal Research Officer, Mark Neyland. Seven RFA forest communities (see Table C) were identified as favoured *Dicksonia* habitat. Forestry Tasmania's Conservation Planning Branch determined the 2006 extent of favoured habitat as follows, using GIS and mapping tools:

- TASVEG mapping units encompassing the identified RFA forest communities were selected and used to calculate the extent of each favoured RFA forest community. A single RFA forest community may correspond to more than one TASVEG mapping unit. TASVEG mapping was used over RFA forest community mapping because it is more recent and is at a finer scale (1:25,000 instead of 1:250,000 for RFA mapping).
- Area analysis was run for each of the TASVEG communities by selected tenures.
- Regenerated forest that was less than 30 years old (i.e post 1977) was excluded from the analysis. This was done due to the results presented by Chuter (2003) and anecdotal evidence that trunked *Dicksonia* is rarely found in regrowth forest less than 30 years old.
- Plantations established in recent years by conversion of favoured communities on PTPZL and private land were excluded based on the 2006 data.
- Rainforest on Precambrian substrates was excluded because *Dicksonia* is not typically found as an understorey species on this substrate.

There have been many studies that have directly or indirectly generated density estimates of trunked *Dicksonia* in various forest communities. Studies providing cover and abundance data for *Dicksonia* in quadrat or transect samples were used to generate density estimates based on conservative assumptions regarding the number of trunked ferns occurring within the sample area for a given cover/abundance value. The lower values of range data were used.

Published information or field data from the following studies were used to determine densities of trunked *Dicksonia*:

- blackwood-dominated communities – cover/abundance data from field information collected by Pannell (1992)

- rainforest communities – a synthesis of cover/abundance data collected by Neyland (1991 plus unpublished data) and frequency data from Kirkpatrick and Moscal (1987)
- eucalypt communities – figures were derived from the basal area data from Turner (2003), which was collected from 87 sites in wet eucalypt forest more than 30 years old in north-western, central and southern Tasmania.

A summary of the estimates of average number of trunked *Dicksonia* per hectare for equivalent RFA forest and TASVEG communities is given in Table C. Other available data on *Dicksonia* density within wet eucalypt forest indicates densities can be much greater than the figures given in this table, with more than 1000 trunks per hectare being suggested by data from some sites (Barker 1988).

Table C: Estimates of average trunked *Dicksonia* per hectare in favoured forest communities.

Equivalent RFA forest community	**Equivalent TASVEG community codes** **(Kitchener and Harris, 2013)**	**Trunked *Dicksonia* per hectare (ha)**
Tall Rainforest	RMT, RCO, RMU	180
Acacia melanoxylon on flats and *A. melanoxylon* on rises	NAF, NAR	170
Eucalyptus regnans forest	WRE, WGL	150
Wet *E. viminalis* on Basalt	WVI	150
Tall *E. obliqua* forest	WOU, WOB, WOL, WOR	105
E. brookeriana wet forest	WBR	105
Tall *E. delegatensis* forest	WDU, WDB, WDL, WDR, WDA	90

The number of trunked *Dicksonia* in Tasmania was re-estimated in the 2022 revision of the *Tree fern management plan*, using TASVEG forest communities rather than RFA forest communities. TASVEG mapping was used over RFA forest community mapping because it is more recent and is at a finer scale. RFA forest communities were converted to TASVEG communities using the equivalence tables in From Forest to Fjaeldmark (Kitchener and Harris, 2013). The conversion was done as the trunked *Dicksonia* per hectare estimates were developed using RFA vegetation communities.

Using the parameters and methods (substituting equivalent RFA community types with TASVEG community types) described above, it was estimated that there is more than one million hectares of forest in Tasmania considered to be favoured *Dicksonia* habitat. From this extent of suitable habitat it was estimated that there are approximately 160 million trunked *Dicksonia* in Tasmania.

It can be seen from the tenure data analysis undertaken in 2017 (Table D) that a small proportion (12%) of *Dicksonia* in Tasmania occurs on private land, 25% occurs on PTPZL and 13% on other public land. The total number of trunked *Dicksonia* in conservation and public reserves is approximately 66 million (50% of the estimated total).

Table D: Estimated numbers of trunked *Dicksonia antarctica* occurring in Tasmania, broken down by land tenure, 2017.

Tenure	Wet forest	Other forest	Estimated total number of stems
Conservation and public reserves	24,949,299	40,673,152	65,622,451
Other publicly managed land	10,052,025	6,520,734	16,572,759
Permanent Timber Production Zone land	25,546,235	7,274,419	32,820,654
Private freehold land	12,932,081	3,250,159	16,182,240
Totals	**73,479,640**	**57,718,464**	**131,198,104**

Source: Forest Practices Authority, 2017

Appendix 2: FPA tree fern research

The introduction of the Tasmanian *Tree fern management plan* and tagging system generated funding for the implementation, monitoring and enforcement of the plan by the FPA as well as for undertaking research into the sustainable management of tree ferns.

Previous research
The following section provides a summary of research undertaken during the duration of the 2017 *Tree fern management plan.*

Influence of site and disturbance history on tree fern dynamics in Tasmania and Victoria: implications for epiphyte and plant diversity.

FPA staff collaborated with a Masters student from the University of Melbourne who addressed Project 1 specified under Appendix 1 of the 2017 *Tree fern management plan* (Project 1: Influence of site and disturbance history on tree fern dynamics in Tasmania and Victoria: implications for epiphyte and plant diversity) (Duck, 2017). This project was summarised in a *Forest Practices News* article (Duck et al., 2018) and the following text is taken from that article.

"The aim of my research was to provide an insight into the impact of natural and human disturbance on tree fern populations in the wet sclerophyll forests of southeastern Australia, and the implications that this has for plant species diversity. Improving our understanding of the impact of wildfire on tree fern populations is of particular importance given the prediction that fire events are likely to become more frequent and severe under climate change in these forests. Furthermore, to assess the appropriateness of current forest management, it is essential to determine whether the impact of timber harvesting resembles that of the natural disturbances under which these ecosystems have evolved.

"Data were collected from the Central Highlands region of Victoria and the Tarkine and Togari region of north-western Tasmania. We collected information on *Dicksonia antarctica* and *Cyathea australis* – height and density, topographic variables, and plant species richness on 28 sites with varying disturbance histories. In Victoria, transects were placed in locations that were burnt by wildfire in either 2009, 1983 or 1939, as well as sites that were CBS harvested in 2009–10, 1983 or 1968.

"In Tasmania, transects were placed in clearfall, burn and sow (CBS) sites that were either 7–10 or 48–55 years old, aggregated retention (ARN) sites 7–9 years old, wildfire sites that had been burnt in 1961 and 1962, and 'old-growth' sites (>100 years old).

"The results showed that:

- Tree fern density on logged sites was lower in the youngest age-class (7–10 years old) but higher in the oldest age class (>49 years old) compared with wildfire sites
- Tree fern density and height were positively correlated with plant species richness, of which a large proportion was fern epiphytes and non-vascular plant species
- No significant difference in tree fern above-ground biomass or plant species richness was found between ARN and CBS sites.

- A significant relationship was found between tree fern height and epiphyte richness, indicating that taller tree ferns have greater epiphyte richness than shorter tree ferns.
- *Dicksonia antarctica* had more epiphytes than *Cyathea australis* at any given size.
- *Dicksonia antarctica* less than four metres in height had greater epiphyte richness when growing in Tasmania than in Victoria.

"The results suggest that there is a positive relationship between tree fern populations and plant species richness, and that tree fern epiphytes and non-vascular plants constitute a large portion of total plant species diversity. The results support the notion of tree ferns as keystone species in these forests, and indicate that tree fern populations may be able to recover from an initial decline in density following timber harvesting. This research contributes to our understanding of interactions between disturbance, tree fern populations and species richness, and will help to inform forest management in these ecosystems" (Duck et al., 2018).

Population distribution, density and epiphytic diversity of *Cyathea australis* in the production forest landscape

During preparation of the 2017 *Tree fern management plan* tree fern harvesters expressed an interest in the harvesting of *Cyathea australis* in Tasmania.. The FPA had planned to undertake a research project into the species to determine the feasibility of adding the species to the *Tree fern management plan* for harvesting (Project 2 Appendix 2, of the *Tree fern management plan*).

Preliminary project discussions with tree fern experts and botanists at the Department of Primary Industries, Parks, Water and Environment (DPIPWE, now NRE Tas) indicated that *C. australis* does not meet the legal definition of a tree (under the *Forest Practices Act* 1985) and therefore it is not managed under the jurisdiction of the Forest Practices Authority and *Tree fern management plan*. It was therefore determined that tree fern harvesters can harvest *C. australis* without a forest practices plan in areas in which the landowner has permitted or a 'permit to take' has been issue by DPIPWE for Crown Land (see Appendix 5 of the *Tree fern management plan* 2022). Tree fern harvesters were made aware of this information in a letter dated 5 February 2019.

Review of Australian tree fern ecology in forest communities

A review of Australian tree fern literature was undertaken by FPA staff (Donoghue and Turner, 2021). Collation of the literature identified a lack of information about key ecological events and cohort dynamics as there is no tracking of long-term impacts of disturbance to tree ferns. While there is some information available on the impacts on tree ferns from wildfire and clearfelling, little is known about impacts due to wind (cyclone) or silvicultural practices such as shelterbelt thinning, cable thinning and salvage harvesting. There is a particular lack of studies documenting the population and disturbance ecology of tree ferns at a site before, during and after a commercial harvest of tree ferns themselves. Information regarding tree fern management for relevant states is included in the paper. The review identified key areas to target future tree fern research (not exclusively relating to tree fern harvesting) including possible climate change impacts, synecology, the effects of different silvicultural techniques and the impact of weather events on persistence of tree ferns.

Long-term research on tree fern resilience in the Central Highlands of Tasmania

In early 2022 FPA staff in conjunction with tree fern researcher Ross Peacock, collected data on tree fern survival at a long term tree fern research site in Wayatinah, in the Central Highlands of Tasmania. This continues the work initiated in the 1990s looking at the effects of harvesting on tree ferns in Tasmania (Peacock and Duncan, 1995). The ongoing data from this project may contribute to the understanding of long-term resilience of tree ferns following forest harvesting.

Proposed Future Research

Research (Duck 2017, Donoghue and Turner 2021) undertaken during the 2017 *Tree fern management plan* period identified gaps in tree fern knowledge and directions to undertake future research to better understand the impacts of harvesting on tree ferns. The key areas to be addressed in future research are:

- Response of tree ferns to harvesting in partial harvest coupes (e.g. seedtree retention, thinning etc.)
- Long term resilience and survival of tree ferns following harvesting.
- Impacts of multiple disturbances (i.e. repeated forest harvesting, extreme weather events combined with harvesting etc.) on tree fern recruitment and survival.
- Response of tree fern recruitment and survival to differing fire intensities and frequencies (relating to post-harvest treatments).
- Impact of various silvicultural techniques (i.e. selective harvesting, salvage harvesting, cable harvesting etc.) on tree fern recruitment and survival.
- Dynamics of tree fern populations between aggregated retention and clearfall, burn and sow silvicultural techniques over long-term time frames and over a larger spatial areas (landscape level).
- Socio-economic value of the tree fern harvesting industry (i.e. the value of the industry, and number of people directly/indirectly involved). The findings of this research may allow the FPA to determine the viability of the industry undertaking standalone harvesting

Appendix 3: Monitoring and investigations of compliance for the 2017 *Tree fern management plan* reporting period

2018-19	**Compliance investigations**	There were no formal compliance investigations in relation to harvesting of tree ferns during 2018–19.
	Enquiries for advice	There were five enquiries for advice relating to the purchase and selling of tree ferns. For all five enquiries advice was provided from the FPA and each enquiry was closed with no further action required.
	Compliance audits[1]	During the 2018–19 compliance audit program, 6% of FPPs audited included tree fern harvesting all of which occurred on Permanent Timber Production Zone land. The average score for harvesting of the audited FPPs was 98.7/100, which is considered sound[2]. The FPPs audited were selected at random.
	Certificates of Compliance[3]	During 2018–19 there were 16 FPPs with tree fern harvesting discreet operational phases (DOP). Half (8) of these were assessed as DOP complied, meaning that all tree fern harvesting provisions of the plan were fully complied with. The other half (8) were assessed as 'the activities under the plan did not proceed', meaning that the planned tree fern harvesting did not take place.
2019-20	**Compliance investigations**	There were no formal compliance investigations in relation to harvesting of tree ferns during 2019–20. There was one potential breach reported, during which tree fern harvesters were found to be harvesting inside an area retained from harvesting under an FPP. The issue was sufficiently dealt with internally by the FPP applicant company, and the FPA determined there was no environmental harm and therefore the issue was closed and not escalated to a formal investigation.
	Enquiries for advice	There were two enquiries for advice relating to the purchase and selling of tree ferns. For both enquiries advice was provided from the FPA and each enquiry was closed with no further action required.
	Compliance audits	During the 2019–20 compliance audit program 0% of FPPs audited included tree fern harvesting. The FPPs audited during this period were focused on private land and coupes cleared of forest and converted to other use and none of these audited coupes included tree fern harvesting.
	Certificates of Compliance	During 2019-20 there were 8 FPPs with tree fern harvesting discreet operational phases (DOP). Three of these were assessed as 'DOP complied', meaning that all tree fern harvesting provisions of the plan were fully complied with. The other five were assessed as 'the activities under the plan did not proceed', meaning that the planned tree fern harvesting did not take place.

[1] Monitoring of tree fern harvesting compliance is carried out in through independent monitoring of a representative sample of forest practices plans (FPPs) in accordance with s. 4E(1)(b) of the *Forest Practices Act 1985* ('the Act'). This is performed annually by the FPA. Under the Act tree ferns are considered 'trees' and auditing of timber harvesting operations includes tree fern harvesting. Therefore the results described below under 'Compliance Audit' are for harvesting with tree fern harvesting results encompassed within.

[2] Sound is defined as 'addressed all judgment criteria and achieved an acceptable result'.

[3] The *Forest Practices Act 1985* requires a compliance report to be lodged with the FPA within 30 days of the completion of each discrete phase of operation (DOP) prescribed within an FPP. Tree fern harvesting is considered a single DOP. These reports must be lodged by the person who applied for the plan.

2020-21	**Compliance investigations**	There was one formal compliance investigation in relation to illegal harvesting of tree ferns during 2020–21. As a result of the death of the suspect, the investigation was unable to progress to conclusion.
	Enquiries for advice	The FPA received four notifications of tree ferns for sale at online marketplaces such as Gumtree and Facebook. After follow up, each enquiry was closed with no further action required. There were six enquiries for advice relating to the purchase and selling of tree ferns. For all six enquiries advice was provided from the FPA and each enquiry was closed with no further action required.
	Compliance audits	During the 2020–21 compliance audit program 1 FPP (or 2.5% of total FPPs audited) included tree fern harvesting. The FPP was on Permanent Timber Production Zone land. The FPP audited was selected at random. This audit was done as a trial for a new auditing system and was not scored in the same way as previous audits. There were no comments or concerns relating to tree fern harvesting in the audit.
	Certificates of Compliance	During 2020–21 there were 24 FPPs with tree fern harvesting discreet operational phases (DOP). Nine of these were assessed as 'DOP complied', meaning all tree fern harvesting provisions of the plan were fully complied with. Fourteen were assessed as 'the activities under the plan did not proceed', meaning that the planned tree fern harvesting did not take place. The remaining one FPP was assessed as 'DOP complied - Operational area is smaller than planned', meaning that the planned tree fern harvesting has been fully or very substantially complied with but is less than the indicated area on the FPP.
2021-22	No data available at time of publication	

Appendix 4: Summary of tree fern harvesting data for the 2017 *Tree fern management plan* reporting period

Locations of tree fern harvesting in Tasmania

Figure 1. shows the locations (by forest practices plan centroid coordinates) of where tree fern harvesting took place during the 2017 *Tree fern management plan* reporting period. This data is taken from the FPA's tree fern tag register and Coverpage database. During the 2017 *Tree fern management plan* reporting period 97% of tree ferns harvested were harvested from Potential Timber Production Zone (PTPZ) tenure, with the remaining 3% harvested from private land.

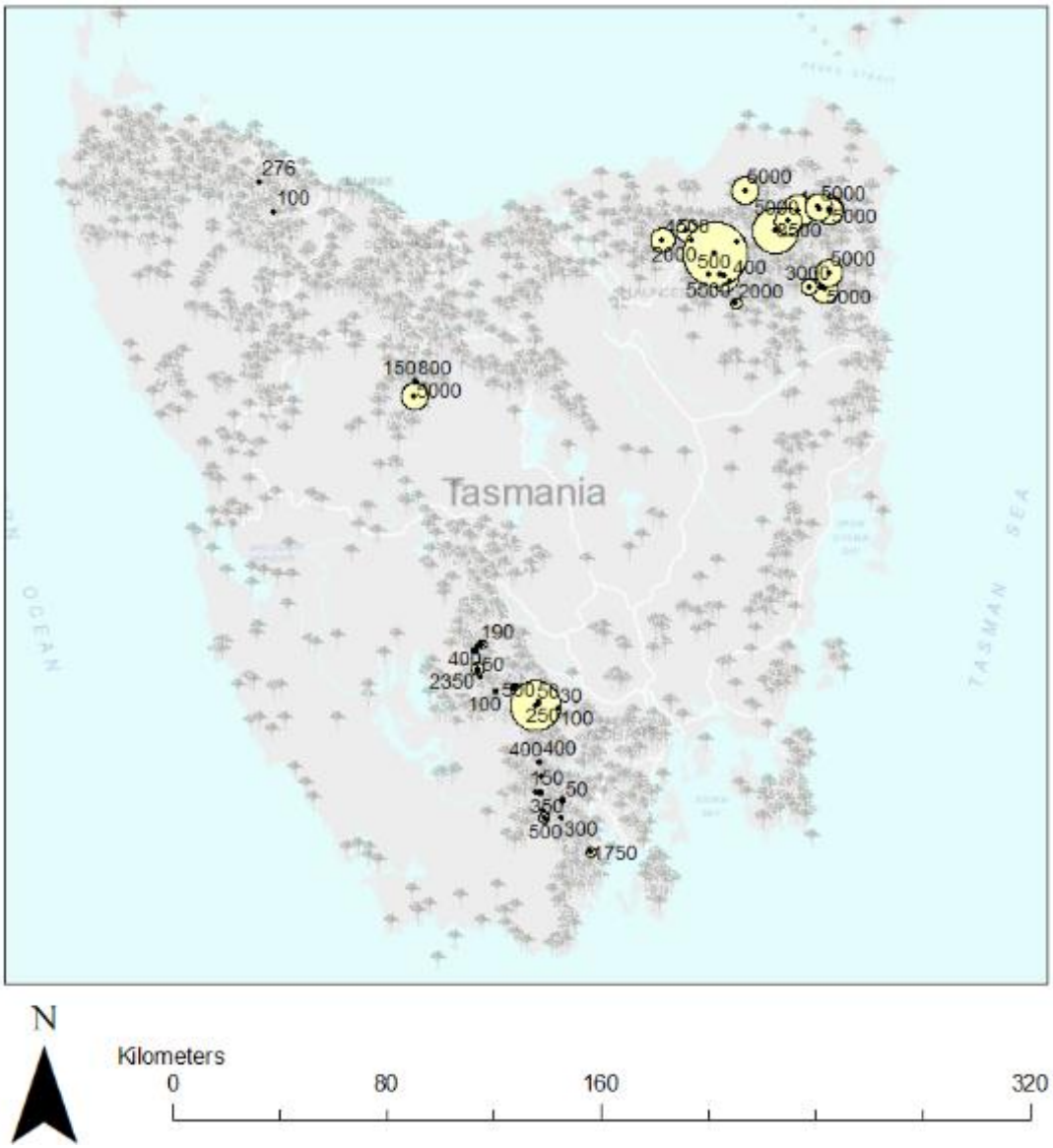


Figure 1. Location of tree fern harvesting in Tasmania with number of tree fern tags per FPP labelled for reporting period 17 October 2017 – 30 June 2022.

Note: The yellow circle sizes are proportionate to the number of tree fern tags purchased (both sizes) with the numbers labelled. The grey tree fern shaped symbols are the records of *Dicksonia antarctica* from NRE Tas' Natural Values Database. The Furneaux islands have been excluded from this map as there was no tree fern harvesting occurring on these islands during the reporting period.

Forest practices plans and tree fern tags

Table E provides details on the harvesting of tree ferns in 2017–18, 2018–19, 2019–20 and 2020–21. This includes a breakdown of tree fern tags purchased by size.

Table E - The number of certified forest practices plans (FPPs) which included tree fern harvesting prescriptions and the number of tree fern tags issued for the 2017 *Tree fern management plan* reporting period.

Year	Total no. of forest practices plans certified	No. (%) of plans that permit the harvesting of tree ferns	No. of tree fern tags issued by the FPA (<30cm stems)	No. of tree fern tags issued by the FPA (>30cm stems)	Total No. of tree fern tags issued by the FPA
2017–18	607	12 (2%)	9600	15 700	25 300
2018–19	654	17 (3%)	2417	12 239	14 656
2019–20	551	14 (2%)	7040	13 380	20 420
2020–21	464	10 (2%)	8014	28 273	36 287
2021–22	Data not available at time of publication				

Appendix 5: Harvesting of *Cyathea australis* (rough tree fern)

Harvesting of *Cyathea australis is* not an activity managed under this plan. *Cyathea australis* does not meet the definition of a tree under the *Forest Practices Act 1985* (for more information see Section 3 of the Act). Harvesting of *C. australis* is therefore not a forest practice and a forest practices plan is not required.

An applicant or landowner may include prescriptions to control the harvest of *C. australis* in a certified forest practices plan, particularly in relation to the use of heavy machinery and restoration of the site. While the harvest of this fern species is not a forest practice the plan may still control harvesting that is incidental to other forest practices approved by the plan.

The current status for harvesting *C. australis* is as follows (see table 2 for a summary).

- *C. australis* is not a threatened species;
- any requests for harvest of this species will require the permission of the landowner on which the harvesting will occur; or
- harvesting on Crown Land will require a 'Permit to Take' from NRE Tas in any circumstance.

Table 2 - Land tenures and permissions required to harvest *Cyathea australis* in Tasmania.

Land Tenure	Owner	Requirement
Potential Timber Production Zone (PTPZ) Land	Sustainable Timber Tasmania	Permission only
Private Freehold Land	Private Owner	Permission only
Crown Land including Future Potential Production Forest (FPPF) Land	NRE Tas	Permit to Take

Any plans to harvest *C. australis* must not harvest the similar-looking threatened species *Cyathea cunninghamii* or *Cyathea X marcescens.* Harvesting of these two threatened species without a permit would breach section 51(1) of the *Threatened Species Protection Act 1995* and could result in fines of more than $100,000 and/or up to two years in gaol.

International export of *C. australis* is controlled under Commonwealth legislation and the DCCEEW should be contacted if you plan to undertake such activity.

Further inquiries about harvesting of *C. australis* should be directed to the landowner or NRE Tas.