National Trust
Every moment an amazing story

Encouraging Enthusiasm for Trees in Melbourne

Lab Discussion Paper

Encouraging Enthusiasm for Trees in Melbourne – A Discussion Paper

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2   Introduction

June 2014

Greater Melbourne risks losing its status as a garden city in the next 50 years, if nothing is done to reverse the forecast for tree loss across the metropolitan area. It has been demonstrated that the urban canopy of greater Melbourne is increasingly subject to multiple threats, including:

- climate change,
- urban densification,
- clearing for bushfire protection
- changing community perceptions of trees posing risk to persons and property,
- pests and diseases, and,
- natural maturing of trees planted during the mid-to-late 19th Century.

Engaging the community in the conservation of the urban canopy will be critical in ensuring that the community is able to enjoy the substantial benefits of urban trees for generations to come. The emerging prominence of citizen science as a powerful conservation tool, both in Australia and overseas, suggests that this may be one method by which we can engage residents in urban tree conservation.

To discuss the practicalities of engaging the community in conservation of the urban canopy, the National Trust will present a Lab on "Encouraging Enthusiasm for Trees in Melbourne" on 23 June 2014, in partnership with the City of Melbourne and the Economic and Social Research Council (UK). This Lab seeks to bring together the best and brightest practitioners in Victoria: strategic and statutory planners, land managers, regulators, researchers, advocates, and arboricultural & landscape consultants. Industry leaders have been invited to guide the conversation:

- Greg Moore, Chair, Significant Trees Committee, National Trust
- Yvonne Lynch, Team Leader, Urban Landscapes, City of Melbourne
- Dave Kendal, Ecologist, Australian Research Centre for Urban Ecology (ARCUE)
- Hilary Geoghegan, Cultural Geographer, University of Reading (UK)
- Chris Gillies, Director of Science, Earthwatch Institute

The aim of the Lab is to:

- To foster open discussion about potential solutions for encouraging community enthusiasm for trees in Melbourne, including community engagement and citizen science programs
- To provide a networking opportunity for Victorian professionals working in the field of tree conservation, particularly for practitioners working in planning or tree management for local governments in Melbourne.

We look forward to your contribution.

Anna Foley
Senior Advocate, Environmental Heritage
National Trust of Australia (Victoria)

3   National Trust community engagement

The National Trust, in its role as a not-for-profit community heritage organisation, has maintained a Register of Significant Trees since 1982, and over the last 30 years has classified over 1200 significant trees, avenues and stands of trees. This has been possible through the ongoing engagement of the community in contributing nominations and updated data to the Register, from the early days of hand-written nominations, to the 2011 launch of our iPhone App *Trust Trees*, to the 2014 launch of the National Register of Significant Trees.

More information on the National Trust's advocacy for environmental heritage can be found here:

http://www.nationaltrust.org.au/vic/EnvironmentalHeritage

More information on the National Trust's Register of Significant Trees can be found here:

http://www.nationaltrust.org.au/vic/heritage-register

Our iPhone App is available from the App Store:

https://itunes.apple.com/au/app/trust-trees/id426819442?mt=8

More information regarding the Trust's shift to digital platforms for community engagement is detailed in this recent paper published by Dr Greg Moore and Dr Sue Hughes, of the National Trust Significant Tree Committee.

Moore G M and S Hughes (2014) *The National Trust of Australia (Victoria), Register of Significant Trees: Now Protecting Community Assets and Heritage with Smart Phone Technology*. Arboricultural Journal **36**(1), 3-17.

This paper is included in Appendix 1.

4   City of Melbourne resources

4.1   Urban Forest programs

For information regarding the City of Melbourne's tree programs, please visit:

http://www.melbourne.vic.gov.au/Sustainability/UrbanForest/Pages/UrbanForest.aspx

4.2   Urban Forest Visual

The City of Melbourne maintains more than 70,000 trees. This website enables you to explore this dataset and some of the challenges facing Melbourne's Urban Forest.

http://melbourneurbanforestvisual.com.au/

4.3   Participate Melbourne

The City of Melbourne also maintains an online hub for community engagement on the Urban Forest Precinct Plans via its *Participate Melbourne* website. This website includes information such as FAQs, YouTube clips, user photos, discussion boards, a document library and social media feed.

http://participate.melbourne.vic.gov.au/projects/urban-forest-precinct-plan

Image source, page 6:
http://www.melbourne.vic.gov.au/Sustainability/UrbanForest/Documents/Urban_Forest_in fographic.pdf

MELBOURNE'S URBAN FOREST

60,000
COUNCIL TREES

$650m
AMENITY VALUE

22%
CANOPY COVER

LOW DIVERSITY
Just three species – plane, elm and red river gum make up more than 35% of Melbourne's trees

+

AGEING
Some of our grandest trees are nearing the end of their lives

=

HIGH VULNERABILITY

Fitzroy Gardens now

CITY OF MELBOURNE EXPECTS TO LOSE

- **27%** of trees in 10 years
- **44%** of trees in 20 years

If no action is taken

CHALLENGES

Pests & Disease
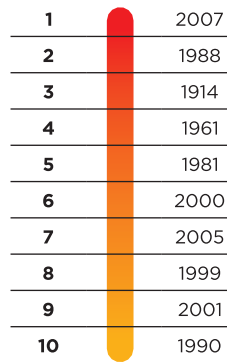Myrtle rust could affect almost 45% of Melbourne's trees

Climate change
Victoria's temperatures are predicted to increase into the future

Victoria has recorded five of its ten hottest years since 1999**

**Ranked according to average daily temperature

1	2007
2	1988
3	1914
4	1961
5	1981
6	2000
7	2005
8	1999
9	2001
10	1990

Increasing Population & Density

THE FUTURE

OUR VISION
The City of Melbourne's urban forest will be resilient, healthy and diverse and will contribute to the health and wellbeing of our community and to the creation of a liveable city.

URBAN FOREST STRATEGY TARGETS
1. Increase canopy cover – 40 per cent by 2040.
2. Increase diversity – no more than 5% of one tree species, 10% one genus, 20% one family.
3. Improve vegetation health – 90 per cent of tree population healthy by 2040.
4. Improve soil moisture.
5. Improve biodiversity.
6. Inform and consult with the community.

HAVE YOUR SAY: melbourne.vic.gov.au/urbanforest

CITY OF MELBOURNE

5 Dr Hilary Geoghegan

5.1 Biography

Hilary is a cultural geographer specialising in enthusiasm, in the Department of Geography and Environmental Science (School of Archaeology, Geography and Environmental Science) at the University of Reading. Through her research, she seeks to understand more fully what motivates and sustains individual and collective participation in activities, hobbies, interests, projects and research. Hilary is interested in relations between people and the material world, particularly as they change over space and time. To date her research has examined passions for technology, architecture, wetland birds, weather and trees.

Hilary has a PhD in Human Geography on the cultures of enthusiasm (with MA in Cultural Geography (Research) and BA (Hons) in Geography with European Study). Prior to joining the University of Reading, Hilary worked at UCL on her ESRC Future Research Leader award researching what motivates and sustains participation in citizen science projects relating to tree health. She has also held an ESRC Postdoctoral Fellowship (2008-09), as well as worked at the University of Exeter on the ESF-funded project 'From Climate to Landscape: Imagining the Future' (2009-12), which connects her work on enthusiasm to understanding the local effects of climate change.

She has also secured research funds from the Royal Geographical Society (with IBG), for a study exploring the role, contribution and value of the volunteer wetland bird counters to knowledge of the effects of climate change and subsequent conservation policy. Hilary is also Co-I (with Dr Hannah Neate (UCLan)) on a British Academy small grant researching 'Cultures of Architectural Enthusiasm' in order to investigate how volunteer guides articulate, experience and interpret 20th century architecture. From April to September 2012, she worked as an AHRC research fellow at the Science Museum on a project gathering the stories and memories of women who worked on the telephone switchboard in Enfield between 1925 and 1960. This also involved an exhibition and project blog.

5.2 Research

Hilary blogs regularly about her research at www.hilarygeoghegan.wordpress.com

A list of Hilary's most recent publications can be accessed here:
http://www.reading.ac.uk/ges/Aboutus/Staff/h-geoghegan.aspx

Hilary was interviewed about her research by the Economic and Social Research Council in 2013. The PDF of that interview is included on the following two pages.

Citizen science in action

Dr Hilary Geoghegan, ESRC Future Research Leader award-holder, explains the role of public participation in tree health monitoring. By **Jennifer Garrett**

IN OCTOBER 2012, two weeks after Dr Hilary Geoghegan began her ESRC Future Research Leader award, Chalara ash dieback was confirmed in the UK. Ash dieback is caused by the fungus *Chalara fraxinea* and can decimate ash tree populations. The disease has since spread across the UK putting 80 million ash trees at risk. Ash, one of Britain's few native tree species, is of significant economic, social and environmental importance. The Government has estimated that reducing the spread of *C. fraxinea* by one per cent each year for 25 years would generate public welfare benefits of between £40m and £130m.

But the sudden spread of this deadly disease was the perfect opportunity to kickstart Dr Geoghegan's research exploring the role of enthusiasm in motivating and sustaining public participation in tree health monitoring.

> ❝ The use of technology in tree health and plant biosecurity monitoring will only increase ❞

She explains: "Trees are integral to the UK's rural and urban landscapes, national heritage and rural economy, and can help mitigate climate change by capturing and storing carbon. Trees are particularly important as culturally visible markers of environmental stress, but emerging tree and plant pests and pathogens are a significant risk. Monitoring is an important step in assessing a tree's condition, as well as identifying and responding to any threats to tree health."

In the Department for Environment, Food and Rural Affairs' (Defra) Interim Chalara Control Plan, published in December 2012, the Government highlighted that alongside legislation, practical action and additional research, the public and other stakeholders need to be mobilised to help respond to the problem and to source trees and plants responsibly from suppliers.

Dr Geoghegan has been working in partnership with Forest Research and the Sylva Foundation. Both organisations recognise the importance of public engagement in tree health, and also the need to understand more fully what motivates and sustains public participation in tree health monitoring. As Dr Geoghegan sees it, co-ordinated approaches are essential for conducting research responding to environmental challenges: "My

research will hopefully help government to find ways of incorporating the social sciences as an interdisciplinary thread through the physical sciences to understand the environment and impacts upon it."

Scientists have warned that the consequences of Chalara ash dieback could be similar to Dutch elm disease, one of the most serious tree diseases on the planet: "In developing my ESRC research, I considered the impact that Dutch elm disease had on the UK: in the 1960s and 70s, Dutch elm disease killed 30 million trees, affecting the provision of multiple economic, social and environmental benefits," says Dr Geoghegan. She adds: "My ESRC award continues a longer-standing collaboration I have with the Science Museum's Research and Public History Department to consider more fully how our understanding of past events informs our decision-making today."

Trees are a particularly emotive issue in the UK, with many organisations and charities involved in protecting trees and forests and helping the public experience them. Dr Geoghegan explains, "If we look at previous tree diseases, it is clear that the public have played a significant role in reporting suspected sightings." Dr Geoghegan points out that the public have never been asked to monitor trees in quite this way before: "Technology, in the form of apps for phones, means that scientists can set the parameters of data collection." She continues: "Chalara ash dieback can be reported and identified much more quickly – this is surely something scientists would have benefited from in the 1970s.

The use of technology in tree health and plant biosecurity monitoring will only increase."

The smartphone app 'AshTag' had a significant effect on the reporting of Chalara ash dieback sightings. The Forestry Commission recently launched its own Tree Alert app, which allows people to report details of suspected Chalara ash dieback, along with an image and location, direct to the Forestry Commission for investigation.

Some warn crowdsourced science poses quality and reliability issues when non-experts collect scientific data with important policy implications. Dr Geoghegan believes that, when done properly, public participation is valuable. "Citizen science is nothing new. Volunteers, amateurs and enthusiasts – so-called 'non-experts' – have participated in scientific enquiry since the mid19th century. Scientific institutions continue to harness citizen knowledge and enthusiasm, and some environmental risks are only learned about through the response of citizens."

Dr Geoghegan acknowledges that there are drawbacks to the increased use of technology in citizen science. Only 40 per cent of the UK population own a smartphone, raising questions of geographic coverage and participation across society. She adds "Opportunities to participate using a freepost survey should not be underestimated."

She continues "In the case of Chalara ash dieback, the need to act quickly and on the scale required has meant that citizens are predominantly employed in the collection of data through observation rather than identification, which is the domain of scientists at Forest Research. But the most pressing question at this point is whether the resources are in place to respond to the increase in scientific data collected by the public."

The Forestry Commission has identified the scale of the problem on its website, acknowledging

that it is unable to respond to each report individually. In Dr Geoghegan's opinion, data needs to be more readily shared between organisations: "Here a collaborative approach is required across the field of tree health."

The involvement of civil society has identified the problem that most people know relatively little about trees. As part of her award, Dr Geoghegan is researching the development of the Open Air Laboratories' (OPAL) new tree health survey outlined in Objective 3 of Defra's Interim Chalara Control Plan. With the increase in pests and diseases affecting iconic trees such as oak, horse chestnut and ash, she believes the public will demand more information about biosecurity and participate more in environmental monitoring. "An important aspect of the OPAL tree health survey is to help highlight these issues and in turn how both living and dead trees can form important habitats for wildlife," she says.

Dr Geoghegan concludes: "Citizens, or rather people – that's you, me, your next door neighbour and Defra's chief scientist – are all in a position to act as early warning systems for future conservation challenges in the UK." She adds: "My ESRC Future Research Leader award gives me the time and resources to build on research in the area of people and science, exploring the dynamics between citizen scientists as data producers and complex subjects and an institutional need for environmental data in the face of growing concerns." ■

Jennifer Garrett is ESRC Communications Officer

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6   EarthWatch Institute

Chris Gillies will be introducing EarthWatch, different models of citizen science engagement, the pros and cons of citizen science, and some examples of EarthWatch's programs including My Tree Tracker.

6.1   EarthWatch's Approach to Research & Citizen Science

From the EarthWatch institute website, http://au.earthwatch.org/

> *We believe that decisions regarding the environment and communities should be based on objective science, and that by connecting people with hands-on science opportunities we can empower a worldwide movement of environmental leaders.*

For more than 40 years, Earthwatch has provided vital long-term human and financial support to objective, peer-reviewed scientific research all over the world. The research that we support informs sound decision-making about the management of the world's natural resources. Earthwatch is a world leader in empowering ordinary people to collect valid and valuable scientific data, while providing those individuals with unique experiences and access to leading scientists.

We aim to demystify science and make accessible to everyone a global suite of projects that support cost-effective, crucial scientific research and seek solutions to environmental challenges worldwide.

Our unique approach provides people from all walks of life the opportunity to work alongside leading scientists locally and globally.

6.2   Citizen Science

Citizen science allows scientists to observe more land, water, and species, to connect with the public in the vision behind the research, and to tap into an alternative means of funding. The data collected are used to build our understanding of how we are impacting our planet and to inform sound decision-making about the management of the world's natural resources.

Citizen science enables volunteers to make a direct contribution to scientific research, discover an unfamiliar place, and learn about a specific environmental challenge. These opportunities provide inspirational, immersive experiences that challenge individuals and transform mindsets.

Ultimately, citizen science allows for more research to be accomplished globally and connects people in a worldwide environmental movement.

7   Appendix 1

Moore G M and S Hughes (2014) *The National Trust of Australia (Victoria), Register of Significant Trees: Now Protecting Community Assets and Heritage with Smart Phone Technology*. Arboricultural Journal **36**(1), 3-17.

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The National Trust of Australia (Victoria), Register of Significant Trees: Now protecting community assets and heritage with smartphone technology

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The National Trust of Australia (Victoria) launched the Register of Significant Trees in 1981. This was to record significant trees throughout the State of Victoria in a logical and systematic manner with the aim of improving their management, protecting them and extending their lifespans. Trees could be registered based on criteria including their beauty, cultural and historic significance and scientific merit measured by rarity, unusual form, as a source of rare propagating stock or their resistance to pests or diseases. By 2012, the *Register of Significant Trees* contained nearly 1200 registered trees or groups of trees and over 22,500 specimens, including Avenues of Honour, which were widely planted in Victoria, especially after World War I. In Victoria, classified trees have no special legal protection, but lists are provided to relevant authorities dealing with roads and water, gas, electricity and communication services and this provides some protection against inadvertent damage. Furthermore, once classified, a level of political protection and moral persuasion sees significant protection given to many specimens. In 2011, The National Trust of Australia (Victoria) launched *Trust Trees*, an iPhone app that can locate a specific tree or a collection of trees (all trees in a particular local government area using *Apple Maps*). Each tree appears as a pin on a map that can be selected for information such as botanical details and historical information, photographs of the tree, its dimensions (height, circumference and canopy spread), and its age and condition.

Keywords: heritage trees; National Trust of Australia; tree protection; iPhone app

Introduction

Land clearing in Australia has a history dating to the late 1700s and early 1800s and within 100 years the loss of large trees and some plant species was noted. In 1905, N.J. Claire reported:

the giant trees now existing are few and far between, and in the consequence of the little interest taken in them by either government or private individuals, in the course of another half century they will have ceased to be. (Quoted in Hill, 1991)

The clearing did not stop and by the 1970s, there was public concern about the loss of native trees, changes to urban and rural landscapes and increasing numbers of rare and endangered plant species. Furthermore, many of the parklands, avenues and boulevards, and botanic gardens planted in the capital and major regional cities of Australia at the turn of the twentieth century were reaching maturity or senescing. By the 1970s, it was recognised that major and significant trees in cities and rural regions and in natural and created landscapes were under threat and required some sort of protection.

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Trees were accepted as important parts of our history and heritage as Ivens (1981) commented:

> the tangible and visible history of our State, in the form of man-made monuments will take us back no more than 150 years, but trees are living monuments capable of transporting us 400 years into the past. (pp. 6–7)

The need for recognition and protection of trees of heritage, landscape and biological significance was urgent, and it is not surprising that those interested in other aspects of cultural and heritage preservation, such as the National Trust of Australia (Victoria) took up the issue.

The Register of Significant Trees of Victoria

Because of public concern, the National Trust of Australia (Victoria) established The Register of Significant Trees of Victoria. It was noted that:

> many of the state's historic buildings classified by the National Trust owe much of their character and charm to the presence of mature trees ... The majority are now over mature and their continued existence can no longer be taken for granted. (Almond & Lumley, n.d.)

Furthermore, there had been a number of situations where individuals and community groups had expressed concerns over the loss of important trees through either ignorance or neglect.

In 1979, the National Trust of Australia (Victoria) agreed to establish a Register of Significant Trees in Victoria, and in 1980, the Australian Heritage Commission financed a pilot study. This paved the way for the establishment of the Register of Significant Trees (Victoria). At the time, it was estimated that about 5000 specimens would be suggested for inclusion in the Register, but that only 500–1000 would be considered worthy of inclusion. Accordingly, the National Trust of Australia (Victoria) launched the Register of Significant Trees in 1981. The purpose of the Register was to record significant trees in a logical and systematic manner and to establish an inventory of such specimens with the aim of improving their management, protecting them and, where possible, extending their lifespans. In several states, the National Trust and other bodies had their own informal lists of notable trees, but these were not comprehensive, often purpose-specific and inaccessible to the public and community groups.

Criteria and selection of significant trees

As might be expected, the approach to and levels of classification used in the Register of Trees were based on the National Trust's established principles and practices of the time in protecting buildings, structures such as bridges and other heritage items. The established practice was for a committee of experts to evaluate the heritage value of the object against a set of objective criteria. The item could be then classified and its details registered. The words classified and registered have often been used somewhat loosely as synonyms, which can create confusion among those unfamiliar with the process. Criteria for the inclusion of trees were established and trees classified at different levels of significance: local, regional, state or national.

In practice, the Register of Significant Trees has only classified trees based on their state or regional significance within Victoria (Moore, 2001). The national level of significance has not been used because each National Trust organisation is State-based and so it was deemed inappropriate to use the national level. However, this is likely to change

during 2014 with the launch of a national Register of Significant Trees with trees of national significance recognised. In addition, the Register of Significant Trees has not used the local significance level, which was available to it, leaving this level of recognition to local communities and local government. The rationale for this has been the realisation of the huge numbers of locally significant trees and the limited resources available for classification.

There is no simple approach to identifying significant trees. Selecting criteria, which are objective, meaningful and broadly understood, has been essential to the success of the Register (Table 1). In general, nominations can be made and assessed under one or more of the listed categories; many trees meeting more than one criterion for nomination. For each of these categories, there is the capacity to provide sub-categories to assist in making decisions about the worthiness of specimens for classification. This option has been used for outstanding size, historical significance and rare or localised distribution (Table 2). The sub-categories provide a clearer and more objective set of conditions upon which to classify significant trees.

Any interested individual or group such as members of the public, government agencies and members of the National Trust can make nominations using these criteria. All that is required is that the appropriate data sheet (Table 3) is completed and submitted for evaluation by the Committee of the Register of Significant Trees. The data presented must be verified as being accurate and reliable, and the committee may gather data via its officers or seek the assistance of relevant local experts, who authenticate the information and measurements provided.

To assist in the completion of the form, a brief summary of the categories under which trees can be classified was provided. These summaries reflect the criteria described, but are presented in a way that can be easily understood by members of the public who might lack the expertise relevant to the trees (Table 4).

Table 1. Summary of categories for registering significant trees.

Horticultural and/or genetic value	Unique location or context
Rare or localised distribution	Particularly old specimen
Outstanding size (girth, height or spread)	Aesthetic value
Curious growth habit	Historical significance
Connection to Aboriginal culture	Outstanding example of species

Table 2. Some of the sub-categories used in registering significant trees.

Outstanding size	Historical significance	Rare or localised
Height	Cultural group	Only known specimen
Circumference (girth)	Public feature	1–10 known specimens
Canopy spread	World War I	10–50 known specimens
Height × Girth	World War II	In the wild
Spread × Girth	British royalty	End of natural range
Height × Girth × Spread	Other royalty	Disjunct community
	Visiting dignitary	
	Australian public figure	
	Victorian public figure	

Note: There are no sub-categories for the horticultural, aesthetic value, age or outstanding specimen categories.

Table 3.   Nomination and assessment form for registering significant trees.

National Trust of Australia (Victoria) Register of Significant Trees Assessment Form				
Family: Botanical name: Common name: Number of trees:				Category(s) Recommended:
Location:				Condition:
Municipality:				Classified:
Ownership:				State/regional
Circumference:	m	Height:	m	Photographs:
Spread:	m	Estimated age:	yrs	
Date measured:				
Description and background:				Longitude:
				- Latitude:
				Access:
				Prepared by:

Note: This is an older and shorter version than the current form in use.

Table 4.   Guidelines to the categories used for the nomination form for registering significant trees.

Categories:
1. Any tree which is of horticultural or genetic value and could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure.
2. Any tree which occurs in a unique location or context and so provides a contribution to the landscape, including remnant native vegetation, important landmarks and trees which form part of a historic garden, park or town.
3. Any tree of a species or variety that is rare or of very localised distribution.
4. Any tree that is particularly old or venerable.
5. Any tree outstanding for its large height, trunk circumference or canopy spread.
6. Any tree of outstanding aesthetic significance.
7. Any tree which exhibits a curious growth form or physical feature such as abnormal outgrowths, natural fusion of branches, severe lightning damage or unusually pruned forms.
8. Any tree commemorating a particular occasion (including plantings by Royalty) or associated with an important historical event.
9. Any tree associated with Aboriginal activities.

Over the past 30 years, there have been several changes to both the structure and the methods adopted by the Register. The criteria for selection and methods of classification have varied. However, in general, the aims are well summarised as follows:

- To systematically record and protect outstanding trees (native or exotic, wild or cultivated) throughout Victoria.

- To create an awareness of the contribution that trees make to the aesthetic, cultural and historic fabric of Victoria.

The achievement of these aims has been through the committee of the Register:

- Selecting trees of outstanding value and placing them on a register to create an awareness of the value of all trees to the community.
- Taking appropriate steps to ensure the preservation of these trees for as long as possible.
- Making a register of trees readily available to individuals, government departments, local governments and the community at large.

The trees or groups of trees are classified based on one or a combination of the following values:

- Objects of beauty.
- Cultural significance.
- Historic significance.
- Scientific importance measured by rarity, unusual form, source of rare propagating stock or resistance to pest or disease.

The committee that oversees the operation of the Register is composed of volunteers, who are recognised for bringing an appropriate expertise in some aspect of heritage, tree biology or tree management to the role. Their task has been facilitated by the appointment of a number of suitably qualified project officers. These officers have been of outstanding calibre and contributed significantly to the success of the Register and to its capacity for dealing with the large number of nominations and the significant number of specimens classified.

Comparison of Registers

The National Trust of Australia organisations based in other states, such as New South Wales, South Australia, the Northern Territory and Queensland, have established Registers of Significant Trees similar to the Victorian model. There were also ephemeral Registers established in Western Australia, Tasmania and the Australian Capital Territory by either the National Trust or similar bodies. Few of these persisted and in many instances, the data gathered were lost. However, the Register in the Northern Territory has been maintained in partnership with Greening Australia, and those in South Australia and New South Wales have been recently reinstated. Currently, the National Trusts of Australia in every State and Territory have committed to the establishment of a National Register of Significant trees using nationally agreed criteria that were developed using the Victorian criteria and experience. This will be launched in July 2014, will be internet-based and is designed to be responsive to smartphones and tablet devices.

There are similar schemes that recognise the significance of important and heritage trees in other parts of the world. In the USA, the American Forestry Association started the Social Register of Big Trees in 1940. This Register is now known as the National Register of Big Trees and lists the largest-known species of native and naturalised trees in the USA. To be eligible for inclusion, the species must be listed in the Check List of Native and Naturalised Trees of the United States (Little, 1979). The largest of the specimens are known as National Champion Trees and the autumn 2013 edition of the Register listed 786 national champions (Anon, 2013). In this system, size is the key criterion for selection and trees are ranked according to a formula based on height, circumference and canopy spread

(Hill, 1991). Of these characteristics, circumference is the most important factor and reflects the forestry-based origins of the scheme. If a champion tree dies or is destroyed, then there is an attempt to find a new champion from the existing list, or to seek a nomination to fill the "Vacant Throne". The scheme provides no legal protection to the trees listed, but protection due to public interest is strong.

In the UK, there are several lists of major and important trees, with The National Trust in the UK maintaining a list which is not publicly accessible and the Champion Trees of the British Isles (Mitchell, 1990) being good examples. Again, the size of the tree is a major criterion for selection and currently there are more than 4000 trees included on The Tree Register database (Anon, 2011). The Ancient Tree Hunt (ATH) began in 2004 as a joint venture between the Tree Register of the British Isles and the Ancient Tree Forum. The Woodland Trust in the UK now maintains the Tree Register, the Champion Tree list and the ATH, which is an active database of over 110,000 trees. Trees are located and recorded by volunteers and partners of the Woodland Trust. The latter sources funding for field surveys and promotes the recording of trees of a particular species or region. There is also a comprehensive, interactive and user-friendly set of maps, which positions trees under the categories of Ancient Trees, Notable Trees, Veteran Trees and Unverified Trees.

In the UK, the term "ancient tree" connotes trees that are biologically, aesthetically or culturally significant because of their great age, which are in the final stage of their lifespans and which are old relative to other trees of the same species. Veteran trees are usually in the second or mature stage of life and have significance for wildlife and habitat, while notable trees have local significance or the potential to form the next generation of veteran trees. The lists record the best-known tree specimens in Britain. Significant trees may be protected by a local planning authority by making a tree the subject of a tree preservation order (TPO). The TPO prevents felling and poor practices such as lopping or topping, and there are provisions for corrective works and replacement plantings if the orders are breached.

In New Zealand, the Register of Notable and Historic Trees was established by the Royal New Zealand Institute of Horticulture in 1976. It has a wide charter and a broader range of criteria than those used in the USA or the UK (Table 5). While the Register of Notable and Historic Trees has no legal status, protection to trees registered can be supported under the *Town and Country Planning Act*. Most local councils have enthusiastically supported the scheme and labelled trees appropriately. An introduction to the Register was published (Flook, 1994), and included regional maps and the locations of important specimens within that region. There were some 2000 species listed from 15 regions of New Zealand. In 2008, the Royal New Zealand Institute of Horticulture established the Notable Trees of New Zealand Trust to maintain the database, which now contains 1030 records representing some 3500 trees (Anon, 2012). The data provided on each specimen have been expanded in accordance with a more recent interpretation of the criteria for selection (Table 6).

Table 5. Summary of categories for registering significant trees in New Zealand.

Objects of beauty
Recognised landmarks
Scientific importance
Sources of rare propagating stock
Historic importance

Table 6.   Categories used in the Notable Trees of New Zealand.

Stature	Feature (size)
	Form (shape)
Historic	Age over 100 years
	Remnant of an original forest or planting
	Association (with an eminent person or event)
	Commemorative (as a record of a historic occasion)
Scientific	Collection (e.g. Arboretum)
	Source (of botanical interest)
	Rarity (found in unusual circumstances or numbers)

Source: Flook (1994).

Registered trees of significance in Victoria

By 2012, the Register of Significant Trees contained nearly 1200 registered trees or groups of trees and over 22,500 specimens (Table 7). These have been selected from an estimated 4000 nominations over the past 30 years. Many trees do not reach the committee for consideration because they do not meet the criteria for registration, but of those considered for registration, 75.9% are subsequently placed on the Register. This mixes native and exotic trees, planted and remnants, and rare specimens that represent one or perhaps a few of their kind. The oldest tree is a *Podocarpus lawrencei* from East Gippsland, which is thought to be over 1000 years old. The youngest, was an *Araucaria bidwillii* planted in the Royal Botanic Gardens, Melbourne, to commemorate the launching of the Register and included after only two years.

There are spectacular avenues of elms and palms that make significant contributions to dramatic created landscapes. Sombre Avenues of Honour commemorate the fallen from over a century of wars. There are ancient snow gums and giant mountain ash, which demonstrate very well that *Eucalyptus regnans* is the king of the eucalypts. There is the tallest redwood growing in the state, the tree under which the Treaty of Melbourne was signed by John Batman and the magnificent *Eucalyptus citrodora* specimens growing at the top-end of Swanston Street, Melbourne. Trees growing on both privately and publicly owned land are also registered, with almost twice the number of registrations being for trees on private land (Table 8).

Avenues of Honour were widely planted in Victoria, especially after World War I, but the tradition continues till today (Cockerell, 2004). In many regional towns, avenues of trees were planted to commemorate all those from the district who served in war. In World War I, Australia had the highest per capita loss of life and casualty figures of any of the allied forces and due to the tyranny of distance, the fallen were not brought back to Australia for burial, but were buried in Europe. Consequently, the locally planted

Table 7.   Number of registered and rejected trees (1981–2012).

	1981–1985	1986–1990	1991–1995	1996–2000	2001–2005	2006–2010	2011–2002
Trees registered	342	247	221	117	93	128	46
Trees rejected	32	80	150	36	26[a]	31[a]	21
Percentage registered	91.4	75.5	59.6	76.5	78.2	80.5	68.6

Note: [a] Numbers are estimates only due to a change in data-recording processes.

Table 8.   Tree location, land type and classification level for registered trees (1981–2012).

Total number of registered entries	1194		
Total number of trees			
Number of entries on public (Crown) land	400	Parks and gardens	102
		Botanic gardens	86
		Forests and bush reserves	49
		National parks	10
		Schools	8
		Avenues of Honour	18
		Cemeteries	18
		Creek/river reserves	45
		Highway/road reserves	50
		Local government reserves	10
		Railway reserves	4
Number of entries on private land	794		
Number of entries removed due to tree death	97	Known natural cause	38 (39.2%)
		Property development	7 (7.2%
		Cause of death unknown	52 (53.6%)
State level of classification	471	Level of classification as percentage	44.5
Regional level of classification	587	Level of classification as percentage	55.5

Avenues of Honour had an added significance in not only remembrance of the fallen, but also as tangible memorials to loved ones. Some 320 Avenues of Honour have been identified in Victoria (Cockerell, 2013), and while some have disappeared, fallen into disrepair or exist as a single questionable specimen, 50 still exist and 18 have been registered (Table 8). Several of these avenues consist of 100 or more trees and in one case, the Ballarat Avenue, contains at least 2300 trees of several different species from the 3771 originally planted.

It is of note that the Register only contains living trees. This would appear not to have been the original intention, but it is the current practice. For the most part, trees of Aboriginal significance, whether dead or alive, are passed on to the Victorian Archaeological Survey (now Aboriginal Affairs Victoria), and they are only classified if other criteria are satisfied. Dead trees are not classified, but their importance may be brought to the attention of other relevant authorities. It is current practice that when a classified tree dies, it is kept on the Register as a historic record, but it is noted that the tree has died.

Consequence of registering significant trees

Once a tree has been classified, the owner of the tree, the nominator and the municipality within which it grows are formally notified. In Victoria, there is no legal protection afforded by the tree being classified, but lists are regularly sent to relevant authorities such as those dealing with roads and services such as water, gas, electricity and communication. This affords some level of protection against inadvertent damage by those who may not be aware of the significance of the trees and are undertaking works. Furthermore, once classified, a level of political protection and moral persuasion sees significant protection given to many specimens.

The Register of Significant Trees Committee has a clear advocacy role in protecting the significant trees that are placed upon its Register and doing all it can within its limited resources to ensure that classified trees are properly managed. It is inevitable in the State of Victoria, where there is no government agency or official tasked with the protection of trees in urban sites, that the National Trust and the Committee of the Register of

Significant Trees are called upon to protect trees more generally. While the chair and members of the committee have no formal advocacy role in such matters, they are active in trying to protect other trees. These may be locally significant or have the potential to become significant trees with the passing of time.

The chair of the Committee of the Register of Significant Trees has on several occasions over the past decade written to the Mayor and Chief Executive Officer of every local government in the State of Victoria advising them of the significant trees growing within their jurisdictions. In these letters, a request has been made that significant trees should be protected under the planning instruments that are available to local government; in the State of Victoria, these are by planning overlays. Such overlays provide a significant level of protection for listed trees under the State's legal system.

However, an all-too-familiar scenario unfolds when a significant tree is threatened with removal for urban development or is poorly managed during such development and the local community objects. If the tree is not protected by inclusion under a planning overlay or other relevant city ordinance, little can be done to save or protect the tree, even if local government is supportive of such action. In short, the planning overlay is a first step in legal protection and without it other and higher legal redress is unavailable.

The National Trust attempts to assist in the management and protection of classified trees by providing a referral service between owners and relevant experts. Members of the Register of Significant Trees committee also provide *pro bono* advice within their areas of expertise on the appropriate management of classified trees, including the removal of senescent trees that pose a high level of risk and hazard as they near the end of their lives. Both the National Trust and the Committee also provide publicity and interact with local government authorities to ensure proper management and protection of specimens growing within their boundaries. Advice is also provided to owners and others whose actions might affect the health and well-being of the tree.

In the case of significant trees threatened by urban development, the National Trust of Australia (Victoria) is a significant and well-regarded advocate for the protection of heritage assets. If the trees are registered there is a very good record of developers, after consultation with members of the Committee of the Register of Significant Trees, altering plans to retain and accommodate trees, with only seven trees being lost to these activities (Table 8). In several other cases, unregistered trees of local significance have also been retained after intervention by the National Trust of Australia (Victoria) and/or members of the Committee of the Register of Significant Trees that saw alteration in the plans of urban subdivision and development sites and in two instances, trees were successfully relocated (transplanted) at developer's expense on site.

Classification of a tree does not require the approval of the owner, nor their cooperation in its future management or protection. However, in most instances, the owners have taken considerable pride in the fact that one of their trees has been classified, and they do take the responsibility of managing such a specimen seriously. In some instances, owners do not want publicity of their tree, and this request is usually heeded. Furthermore, there are cases where publicity of a specimen may pose the threat of future vandalism, and in such instances, care is taken to keep the precise location from public view.

Smartphone app: the Register launches into the twenty-first century

Funding from Victoria's Heritage Grants Program 2010–2011 was used to contract WSP Digital to develop an iPhone applet called *Trust Trees*. The aim of *Trust Trees* was to

provide greater public access to heritage trees, and to raise community awareness, knowledge and understanding of our living heritage through new mobile-phone technology. The total cost of developing the app was AU$ 24,000 and it was for iPhone use only. Further development for Android device use would be at a lower cost as there are savings to be made in the transfer of data and other efficiencies.

Trust Trees can be used to locate a specific tree or a collection of trees (all trees in a particular local government area, for example) using *Apple Maps*. Each tree appears as a pin on the map that can be selected and drilled down on for more detailed information such as botanical details and historical information, photographs of the tree, its dimensions (height, circumference and canopy spread) and, in many cases, for data on the tree's age and condition. The technology can be used on a computer at home to plan a trip, or in the field using various compatible devices. For many users, downloading the app to their computer and then loading to their phone or other device is probably most efficient in terms of time and cost. Table 9 provides some typical user and reviewer feedback of the app.

In its first week of operation, more than 200 users (Figure 1) downloaded the app and over the period from April 2011 to the end of December 2013, there were 4506 downloads of *Trust Trees* (Figure 1). By comparison, only 21 copies of the hardcover version of the register had been sold in the nine months preceding the availability of the app. Updates to the app are provided and launched every quarter and there have been some 17,976 updates downloaded since the launch (Figure 2).

The graphs demonstrate the impact of the quarterly updates and their associated launches, which are timed to coincide with the southern hemisphere seasons (Autumn: March 1 to May 31; Winter: June 1 to August 31; Spring: September 1 to November 30; and Summer: December 1 to end of February). The seasonal updates are themed around the particular season and are promoted on the National Trust of Australia (Victoria) website, at the Apple Store, in the State print and electronic media and via widely circulated postcards to interested community groups and stakeholders (Figure 3). The app has also been occasionally listed as a featured app on the App Store under Reference Apps > What's Hot? > 24th in Australia & 24th in New Zealand. The high number of updates suggests that the promotions have been very effective.
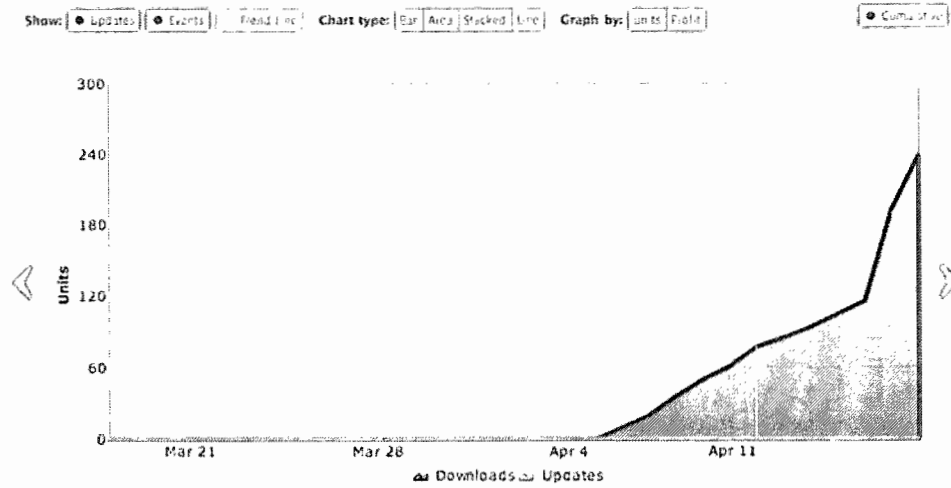
Since the launch of the app, there have been a small number (< 10) of new nominations of trees for inclusion on the Register by people who have used the app, visited a tree and then nominated another tree on the basis of the comparison of the tree described

Table 9.   Typical app review and feedback from users and reviewers.

Great
by TF on Thursday, 24 October 2013
Great app for finding cool trees around Victoria!
Inspiring app!
by Z on Wednesday, 5 October 2011
I'm really enjoying seeking out local national trust trees. Only criticism is that map function isn't working for me.
Well done National Trust
by A5 on Saturday, 20 August 2011
Of general interest and great for schools too
The best ever
by r on Wednesday, 6 April 2011
Very good graphics, nice pictures has all around Vic trees, tells the location of the trees.

Note: The identity of reviewers has been concealed for privacy.

Chart

Figure 1. Download and update reports from the launch on April 5 and for the first 12 days of availability showing: downloads of about 10–14 per day with a major spike over the weekend of 16 April and 17 April 2011 following coverage in a major Victorian newspaper, *The Age*, on 16 April 2011.

in the app. Each quarter, there have also been a small number (<5) of emails from app users who have advised of changes in the condition of the tree, trees in need of protection or management, registered trees threatened by development or poor management and of registered trees that have died or been removed.

It is not difficult to see why the app has such appeal to users, especially when compared to the printed version or even that on the National Trust of Australia (Victoria) website. It is mobile, readily accessible and can be used as a convenient field guide, whereas the printed Register was a large, thick and heavy A4 document. However, the app retains its accuracy and distinctive purpose and the data are well organised and concisely presented alongside images of the significant trees that are of high quality.
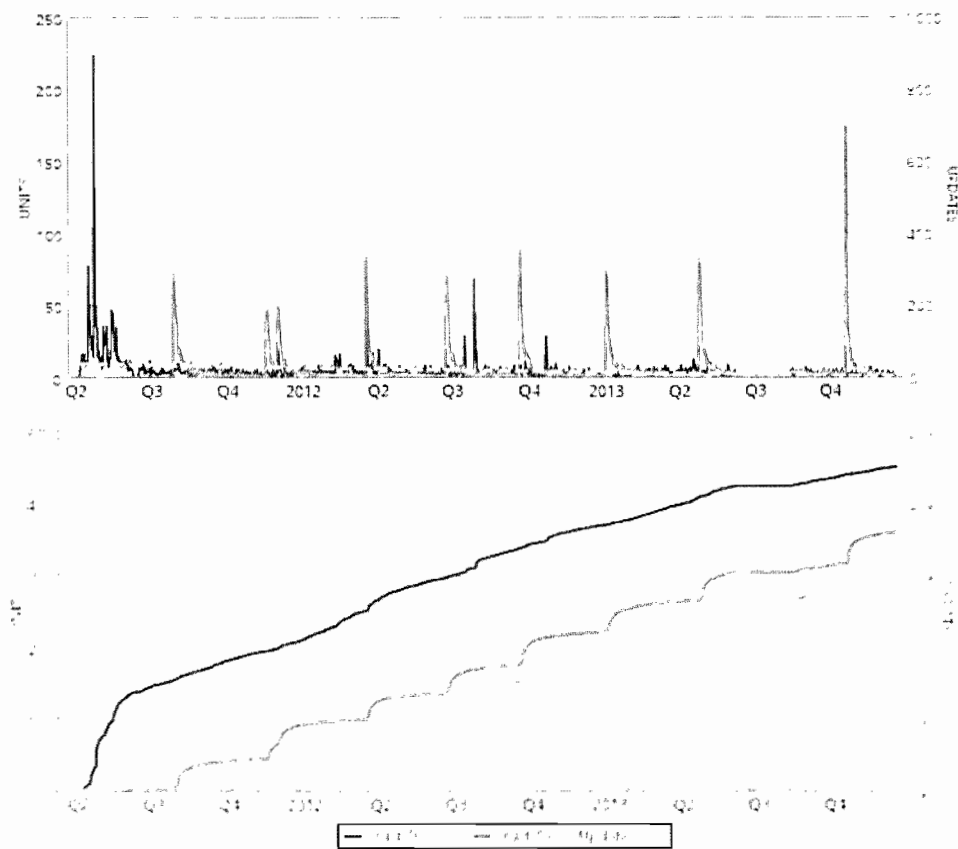
Figure 2.   Download and update reports from the launch on April 5 until the end of the December quarter in 2013. The spikes coincide with the seasonal updates and launches of the app in summer, autumn, winter and spring of each year.

The app allows users to locate significant trees and the images ensure that they are looking at the correct specimen if there are several or many trees in the vicinity. The fact that most mobile phones and tablets incorporate cameras also means that users can photograph trees which they think are the equal of or perhaps superior to those classified and send the image to the National Trust of Australia (Victoria) for consideration for classification with their locations accurately recorded by the phone's in-built GPS. Images can also be sent of registered trees whose canopies, root systems or environments are threatened by development and poor management that inform the National Trust of Australia (Victoria) of potential threats – they become a part of an early warning system that may allow intervention before serious damage is done and trees are lost.

One of the early instances of the app being used to protect trees occurred when road and parking construction works were undertaken near an outer metropolitan railway station. The works impinged on a registered elm growing on the roadside and members of the public used the app to discover that the tree was registered and alerted the National Trust of Australia (Victoria) officers, who then contacted road and rail authorities to ensure that the tree was undamaged. Furthermore, once alerted to the fact that the tree was a registered significant tree, the authorities developed a tree management plan to secure its future. Similarly, extensions to the veranda of a large supermarket, part of a well-known
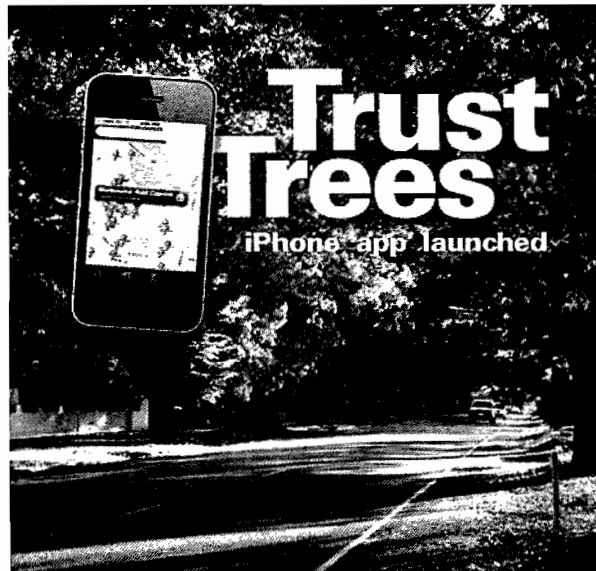
Figure 3.   Postcard used to promote the launch of the smartphone app.
Note: Similar quality images and cards were used for each of the seasonal updates and launches of the app.

chain, in a regional seaside town resulted in some of the trees having their canopies pruned. The trees were registered and a number of people using the app contacted the National Trust of Australia (Victoria) which was able to negotiate with the developer so that fewer trees were damaged and to ensure that trees would be appropriately managed after the damage.

A rare Studley Gum, *Eucalyptus x studleyensis* (a natural hybrid between *Eucalyptus camaldulensis* and *Eucalyptus ovata*) at Eaglemont, which had been on the Register for many years was suffering from years of neglect and a build-up of rubbish and garden litter around its trunk. A member of the public alerted National Trust of Australia (Victoria) officers of the tree's condition using the feedback option on the app. Remedial works were undertaken immediately and the tree is now in good condition. The app has also been used by a tree enthusiast who recognised that there were a number of trees growing in their suburb worthy of registration after comparison with similar specimens on the app. He and his colleagues successfully nominated over 30 specimens that were registered, and some of these were subsequently protected by a local government planning overlay.

The app has also broadened the National Trust of Australia (Victoria)'s capacity for monitoring registered trees and maintaining the currency of the Register's database. Once the eyes of a small committee and a few interested and knowledgeable people were looking at significant trees, but now there are at least 4506 real and potential custodians of the State's heritage trees. The app has already achieved the aims of improving awareness, knowledge and understanding of heritage trees and there is every reason to believe that this will expand in future years along with the number of users.

Conclusion

It is interesting that few of the registers of heritage, notable or significant trees have any legal standing that affords the specimens listed protection. Some can be linked to local

government regulation or parliamentary statute, however, the real protection and value of such schemes is that they bring specimens to public attention and raise the public profile and interest in the future management of such trees.

Heritage and significant trees are important assets to the community and have a significance that stretches across considerable time and several to many human generations. By registering such specimens, public awareness of their contributions is heightened, the quality of their management improved and the prospects for longer lifespans increased. The Registers do not guarantee proper management and long-term survival of these specimens, but they have been successful in bringing such trees to the attention of the public and securing a considerable measure of protection against mismanagement and damage.

The development of an effective smartphone app brings the use and value of National Trust of Australia (Victoria)'s Register of Significant Trees to a new generation and expanded the number of new users. The app, which is an innovative use of smartphone technology within a heritage-related context, has reinvigorated interest in significant trees. It gives those managing the Register a capacity for new registrations and the updating of previously overlooked data on registered trees. Current downloads and feedback provided from the app suggest that the number of new nominations of significant trees will increase in the years ahead, expanding both the scope and relevance of the Register.

It is clear that the app provides, and will continue to provide, improved access to heritage trees. App feedback and user emails also suggest that the level of protection afforded to significant trees through public awareness and interest will increase. The uptake of the app, the number of updates and the user feedback received since the launch of the app in 2011 indicates that the community is keen to engage with the Register of Significant Trees.

Acknowledgements

Notes on contributors

Greg Moore, Senior Research Associate of University of Melbourne, was Principal of Burnley College (1988–2007), and Head of Resource Management, University of Melbourne (2002–2007). He was inaugural president of the ISA, Australian Chapter, a member of the National Trust's Register of Significant Trees (1988 to present) and served the Board of Greening Australia for 20 years. He has written two books and published over 120 scientific papers and articles.

Sue Hughes, PhD in Environmental History and an Honours Degree in Cultural Heritage Management, as Senior Environmental Advocate for the National Trust of Australia (Victoria), oversaw the operation of the Register of Significant Trees and campaigned vigorously to improve the management and protection of trees of outstanding value. Working in a team, she developed and

launched the "Trust Trees" iPhone app for the National Trust. She is currently working as a freelance environmental historian.

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