NZDFI NEW ZEALAND DRYLAND FORESTS INITIATIVE
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Specialty Wood Products Research Partnership

CONSULTATION PAPER

Durable eucalypt forests:

A multi-regional opportunity for investment in NZ drylands

Prepared for central government, regional government, and those involved in the forestry and agriculture sectors of New Zealand's east coast regions.

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EXECUTIVE SUMMARY

This consultation paper is the first step in a process to develop the New Zealand Dryland Forests Initiative (NZDFI) regional strategic plan, focusing on the establishment of durable eucalypt forests in New Zealand's dry east coast regions. We aim to engage with central government, regional government and those in the forestry and agriculture sectors including NZDFI's landowners, stakeholders and other supporters.

NZDFI seeks responses to key questions identified in this paper (see page 14). Your feedback will guide our direction in developing our regional strategic plan.

Since 2008, the New Zealand Dryland Forests Initiative (NZDFI) has focused on tree breeding and research to develop the foundation for its vision of creating 100,000 ha of durable eucalypt forests. These forests will be established in New Zealand's east coast regions by 2030, and could generate an estimated $2 billion in annual sales of naturally durable timber products by 2050.

Regional development and employment could be generated through local processing to produce high value export products that are a sustainable alternative to unsustainably logged tropical hardwoods.

Over $3 million has been invested into the NZDFI's work to date. A network of trials has been established; a long-term breeding programme will produce the first genetically improved seedlings by 2020; and strong partnerships with research providers, landowners and industry have been developed.

The case for durable eucalypts as a land-use alternative in east coast regions can be summarised as follows:

- The NZ Government is very keen to encourage and support new forest planting at a national level, with a 'One Billion Trees' target over the next ten years. Durable eucalypts have significant potential in any new forest planting in drier east coast regions.
- Our trial network confirms the high productivity and potential of selected durable eucalypt species in demanding, low-rainfall east coast conditions.
- National and international markets for durable eucalypt products have been identified: these markets are diverse, often high-value, and sustainable.
- Durable eucalypt forests will mitigate the market and environmental risks that go with New Zealand's current radiata pine monoculture (around 90% of plantation forests in New Zealand are radiata pine).
- Durable eucalypts will confer numerous environmental benefits, including a reduction in the use of CCA-treated timber, provision of nectar and pollen for bees and birds, carbon sequestration, and soil erosion control.
- The NZDFI's investment in research has led to the evaluation of these new species for rapid selection and propagation of high-performing genetic material.
- The NZDFI team has developed significant skills and contacts, and will continue to work hard to provide leadership, research and development expertise, and to communicate and collaborate widely.

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1 RECENT DEVELOPMENTS IN THE FORESTRY SECTOR

The New Zealand elections in October 2017 delivered a Labour/NZ First/Green government that has already announced it will set up a new Forestry Service as a part of its regional development plans. This new organisation will be tasked with planting one billion trees over 10 years with a target of planting 100 million trees annually at 1000 stems per hectare; this equates to 100,000 hectares annually.

Each year about 50 million trees are already planted in New Zealand, with many used to re-plant cut-over (recently harvested) pine forest. The new Government's planting target aims to double this. This commitment to directly invest in planting new forests is one of the Government's regional development goals, and will create jobs in the regions with roles in forest establishment, management, and nursery stock production.

Given this recent announcement by the new Government, this consultation paper has been prepared by NZDFI's partners to seek feedback on their vision for the planting of 100,000 ha of forests to produce durable eucalypt timber in the dryland east coast regions from Gisborne to Wairarapa in the North Island, and in Marlborough, Nelson and North Canterbury in the South Island.

More specifically, NZDFI wants to engage both central and regional government, together with those in New Zealand's forestry and agricultural sectors, to achieve NZDFI's vision by developing a multi-regional strategic plan to provide direction on empowering landowners to successfully plant new durable-eucalypt forests.

The NZDFI's first major milestone on the path to achieving our vision to 2030 and beyond will be to commence commercial release of improved planting stock by 2020.

While $3 million has already been invested in NZDFI's research programme to produce improved planting stock, significant financial capital and land, along with skilled human resources, are all required if over 100 million trees are to be planted in the ten years that follow.

2 WHY INVEST IN PLANTING DURABLE EUCALYPT FORESTS IN NEW ZEALAND'S EAST COAST REGIONS?

- ***International and domestic market demand for sustainably produced high value naturally durable hardwood***
- ***International and domestic market demand for high strength engineered wood products***
- ***Diversify the forestry sector by introducing an alternative to radiata pine for east coast regions***
- ***Reduce use of CCA treated pine in NZ's agricultural, horticulture and viticulture industries, and urban environments***
- ***Environmental benefits of carbon sequestration, honey production and erosion control.***

2.1 International and domestic market demand for sustainably produced high value naturally durable hardwood

By establishing forests of elite eucalypt species, New Zealand can become a leading sustainable producer of naturally durable hardwood. This hardwood will be processed in the regions where it is grown, and supplied as high-value products for domestic and export sales.

There is market demand for hardwood timbers that are naturally durable. These timbers need no preservative treatment. They are accepted by organic producers, and avoid the environmental problems associated CCA treated timber, including disposal problems and soil contamination.

Coloured heart wood associated with tropical species such as teak and rosewood are highly sought after by international markets with much of this demand is currently supplied from illegal/unsustainable sources. For example, the current rosewood craze is apparently worth more than the trade on ivory, pangolins, rhino horn, lions and tigers put together (e.g. see http://www.unodc.org/unodc/en/data-and-analysis/wildlife.html and http://www.bbc.co.uk/programmes/p05hll9v).

There are international efforts to combat illegal timber trade and consumers are demanding sustainable supply with Australia, EU countries and the USA all having laws that require wood imports to be from legal sources. As some durable eucalypt species are renowned for their rich, dark timber these can substitute tropical hardwoods and be given a strong sustainability brand if grown in NZ durable eucalypt forests managed under sustainable principles.

The opportunity in China alone is large, with annual imports of up to 15 million m^3 of hardwood logs, and 10 million m^3 of hardwood sawn timber, worth over US $8.4billion (FAO 2016).

In Australia, indigenous durable eucalypt forests have been producing highly prized hardwoods such as ironbark and jarrah for domestic and export sales since the early 1800s and throughout much of last century. However, conservation needs and logging restrictions have created significant supply gaps, as plantation eucalypts in Australia are almost universally grown for pulp wood rather than high-value timber uses, with what's left of the traditional native timber cut principally for sale to valuable domestic markets.

While there have been some durable eucalypt plantations established in Australia,(for example http://www.heartwoodplantations.com.au/), these are insufficient in scale to substitute the huge log supply formally cut from the indigenous eucalypt forests. The most recent report by Australian Forest and Wood Products Statistics indicates that Australia is importing more than $5 billion in wood products annually to meet the demand unable to be supplied locally.

There is also significant NZ domestic market demand for imported durable hardwood required for critical infrastructure products such as cross arms for power poles, rail sleepers, posts and poles that underpin NZ's electricity and rail networks, as well as vineyard posts and posts for kiwifruit, hops and other horticultural crops needing trellis structures.

NZ consumer demand for imported hardwoods includes timber for specialty decking, flooring and joinery.

NZ's Annual Forestry Statistics produced by the Ministry for Primary Industries (MPI) reported for the year ended 30 June 2017 that total hardwood timber imports were over 40,000 cubic metres and worth almost $50 million with $1,200 per cubic metre therefore the average unit value of the sawn timber imported. This includes SE Asian Kwila, North American white oak, South American

purpleheart, Tasmanian oak and many others. (See ***Appendix 1***; also full statistics at https://catalogue.data.govt.nz/dataset?tags=forestry)

An average unit value of $1,200 per cubic metre for imported sawn hardwood timber is two and half times greater than the average unit value of NZ's radiata pine sawn timber exports. While total pine exports were worth over $800 million to end of June 2017, the average unit export value is only $472 per cubic metre.

2.2 International and domestic market demand for high strength engineered wood products

Production and export of 61,000 cubic metres of radiata pine based laminated veneer lumber (LVL) and plywood is currently delivering the highest export unit value for forest products processed in NZ. To end of June 2017, annual exports were worth over $127 million with an average unit value of over $2,000 per cubic metre.

LVL producers in New Zealand are looking for an alternative fibre supply to radiata pine as the size of timber buildings is increasing dramatically and large wooden construction places high demands on the stiffness of the utilised timber products. There is a market premium of 30% for super-stiff timber products (16 GPa and above) but these cannot be manufactured from radiata pine as it does not produce wood of high stiffness. 13GPa pine LVL is the maximum manufactured commercially in NZ.

On optimal sites, eucalypts can achieve growth rates that exceed those of radiata pine while producing much stiffer wood. Therefore, eucalypts could be well-suited to supply wood for structural timber products such as LVL or plywood, achieving three different objectives:

i. production of higher value structural products (16 GPa and above) that require exceptionally stiff veneers could be obtained from some durable eucalypts in reasonable quantities
ii. for standard LVL products (8 - 13 GPa), which are currently manufactured from radiata pine, fibre costs could be reduced by utilising trees grown in shorter rotations and achieving higher veneer yields
iii. manufacture of a high stiffness hybrid eucalypt and radiata pine LVL will produce a greater total volume of product for export thereby adding value to NZ's pine resource.

2.3 Diversify the forestry sector in Marlborough/Nelson and North Island east coast regions

Marlborough/Nelson and the North Island east coast regions from Gisborne to Wairarapa already have a successful radiata pine forestry sector that makes a major contribution to regional GDP as shown in NZ Institute of Economic Research (NZIER) 2017 report on 'Plantation forestry statistics' and ***Figure 1*** below:

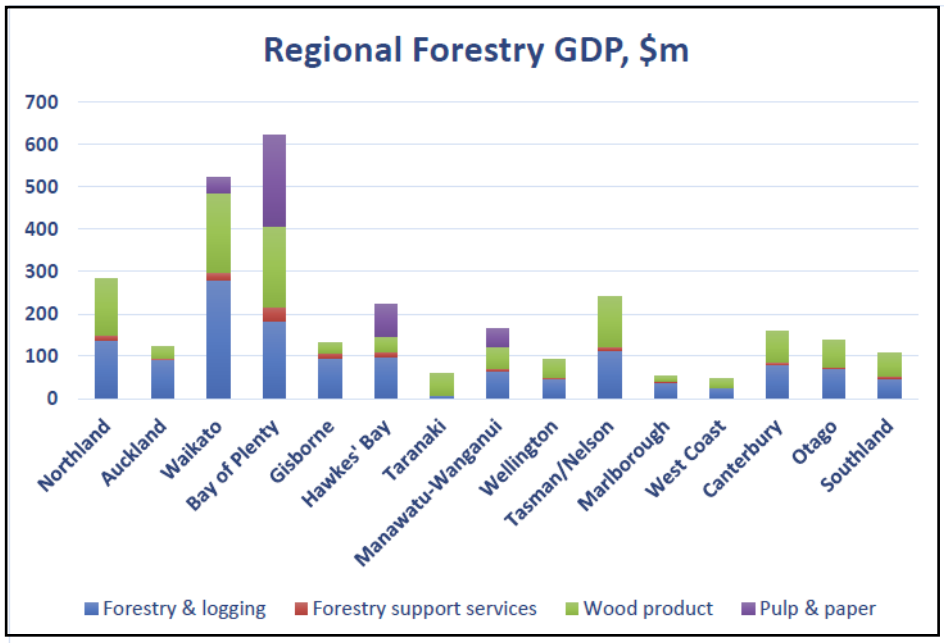


Figure 1: *Contribution of forestry to regional GDP. (Source: NZIER)*

The forest industry in these regions already supports many thousands of jobs, both in managing the 537,000 hectares of plantations, and in harvesting, with an estimated 3.1 million cubic metres harvested in 2017. These regions are also well serviced with timber processors and export ports.

Like the rest of NZ, forest growers in these east coast regions rely almost totally on a single species, radiata pine, leaving the industry vulnerable to climate change, fluctuations in market demand and the threat of pests and diseases. Climate change will bring hotter and drier conditions in the east of the country, with more frequent, and more severe, droughts (e.g. see https://www.niwa.co.nz/our-science/climate/information-and-resources/clivar/scenarios#regional). NZDFI's unique research focus has identified not only that the east coast's soils and climate have the potential to diversify forestry by supporting durable eucalypt forests, but also that our selected species can survive and thrive in demanding summer-dry conditions.

NZDFI are promoting the rapid expansion of a sustained planting programme in the east coast regions to establish a resource that can produce sufficient future log supply to sustain a new hardwood industry. Their vision is for a mosaic of forests rather than only large-scale plantations, as there could be a durable eucalypt woodlot planted on every dry hill country farm in these regions.

2.4 Reduce use of CCA treated pine in NZ's agricultural, horticulture and viticulture industries, and urban environments

There are large volumes of CCA-treated timber used in NZ's diverse agricultural industries (for example vineyards and kiwifruit orchards) as well as in urban environments. This use is projected to continue and increase as a result of land-use intensification. This is despite increasing international consumer resistance to CCA-treated timber, with use restricted or banned in many countries.

There are market advantages and significant environmental gains if NZ can reduce the production of CCA-treated products and thereby reduce hazardous wood waste going to landfills or being illegally dumped or burnt. For example, NZ's grape growers break many thousandsof posts annually during harvesting. These broken posts are a hazardous waste and require disposal to a secure landfill which

is expensive. This waste stream and associated costs will be eliminated by using naturally durable posts.

2.5 Environmental benefits of carbon sequestration, honey production and erosion control

New eucalypt forests could sequester greater amounts of carbon than pine due to their rapid early growth and higher wood density. They can be planted for inclusion in NZ's Emissions Trading Scheme.

There is significant pressure on New Zealand's apiary industry including the need for bee forage to support hives. Durable eucalypts flower prolifically producing high-quality nectar and pollen able to support bees, and hence can contribute to hive health and honey production. Some durable eucalypts flower outside the Mānuka flowering season, and so plantations could be established to complement Mānuka honey enterprises. Many types of *Eucalyptus* honey are sought after in Australia so extensive plantations in New Zealand's east coast will present the opportunity for an additional honey crop.

New Zealand's east coast faces increasingly frequent and severe droughts, and more high intensity storms, due to climate change. Planting durable eucalypts could enhance long term environmental sustainability by combating soil erosion: durable eucalypts have extensive root systems with some species able to grow on skeletal soils and to rapidly recycle soil organic matter. They also coppice (re-sprout) following felling, thereby minimising the post-harvest time-period without canopy cover, a predisposing condition for erosion.

3 WHAT DOES THE NZDFI OFFER NEW ZEALAND?

- ***Long-term investment in research and development to produce genetically improved planting stock for NZ east coast regions***
- ***Extensive established trials and data***
- ***Significant stakeholder and industry investment in research to diversify NZ forestry sector***
- ***Skilled and energetic team that provide leadership; inform and collaborate with a wide group of stakeholders***
- ***Māori Involvement and commitment to Vision Mātauranga***
- ***Branding of NZDFI germplasm***

3.1 Long-term investment in research and development to produce genetically-improved planting stock for NZ east coast regions

NZDFI was established in 2008 as a collaborative tree breeding and forestry research project to improve drought-tolerant eucalypts that produce high-quality naturally ground-durable hardwood to supply New Zealand's domestic demands and be exported to international markets.

Knowledge of these markets has led the NZDFI into a product-focused research programme. It is envisaged that growers will benefit from two income streams, by harvesting at different ages:

i. On flat to easy sites with good road access and short transport distances, roundwood thinnings or clear fell from around age 12 onwards: logs suitable for preservative-free posts and poles for vineyards, horticulture and organic enterprises, and potentially for rotary peeled veneers
ii. On less accessible sites, sawlog harvest at around age 25 onwards: timber for cross-arms, sleepers and poles (rail and outdoor landscaping), small wharves and marinas including decking, furniture and interior fittings (Asia), and engineered wood products.

NZDFI has selected species based on their proven adaptability and productivity in drier east coast regions, and their ability to produce durable high stiffness heartwood.

Extensive trials of these select species have been established by NZDFI from Bay of Plenty to North Canterbury and they are the foundation of the NZDFI research programme (see ***Figure 2***).

NZDFI is on target to start delivering genetically-superior plants to growers by 2020, as the first selections have been made and Proseed NZ Ltd commenced the planting of seed orchards in Canterbury in 2016.

NZDFI's breeding programme is accompanied by research on site-species matching to provide confidence to growers to select sites where the species will be successful. Our research data will provide for the development of growth and yield models as well as protocols to manage tree health. Research has also commenced with wood processors to assess the production of high strength LVL using durable eucalypts.

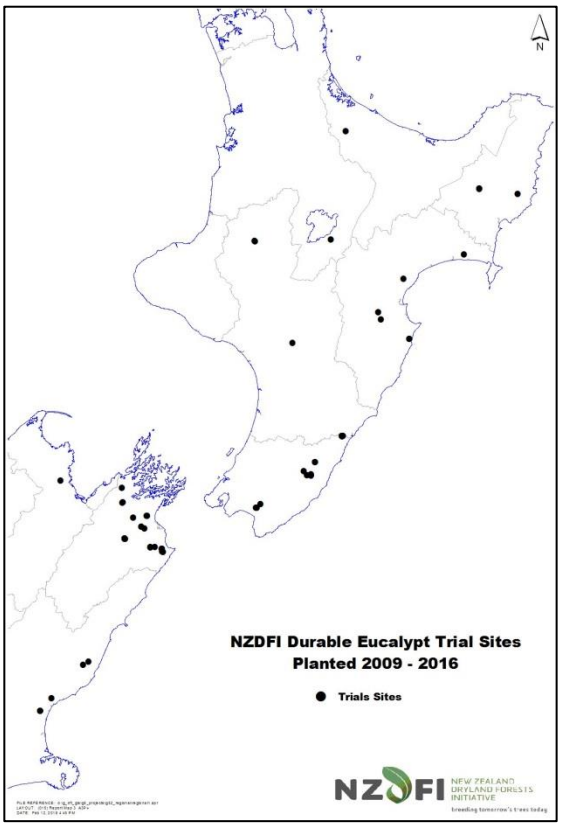


Figure 2: *NZDFI trial site network.*

3.2 Significant stakeholder and industry investment in research to diversify NZ forestry sector

From 2008 – 2016, $3M has been invested in the NZDFI research and development programme with about $0.6M from central government via two MPI Sustainable Farming Fund projects and $100K from AGMARDT. NZDFI's founding partners (see **Appendix Two**) invested $1.8M over this time with another $0.5M from other supporters including Marlborough Lines, NZ Farm Forestry Association, multiple regional councils and forest growers from NZ's east coast regions (Bay of Plenty, Gisborne, Hawkes Bay, Horizons, Greater Wellington, Marlborough and Canterbury).

In July 2015, NZ Forest Growers Research Ltd, with funding from NZ Forest Growers Levy Trust and support of NZ Forest Owner's Association, established the Speciality Wood Products (SWP) research partnership with the Ministry of Business Innovation and Employment. Via this partnership both the University of Canterbury and the Marlborough Research Centre Trust are contracted to continue with NZDFI's durable eucalypt tree improvement programme, while Scion are contracted by NZ Forest Growers Research Ltd to continue research on non-durable eucalypts already planted in New Zealand for sawlog and pulp wood production.

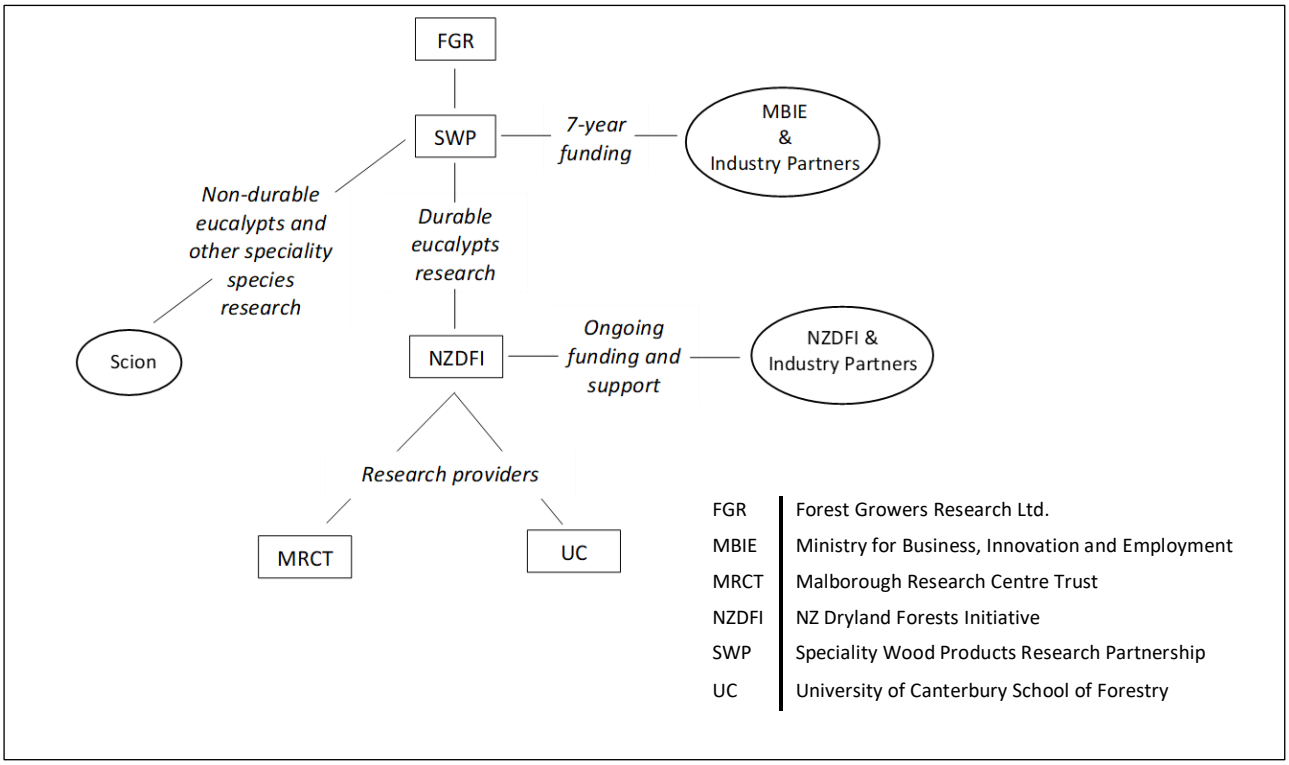


Figure 3: *Relationship between NZDFI, its stakeholders and research providers.*

While funding for this partnership ends on 30th June 2022, NZDFI's programme aims to commence commercial release of improved nursery stock from 2020.

3.3 Skilled and energetic team that provide leadership; inform and collaborate with a wide group of stakeholders

The Marlborough Research Centre Trust (MRCT) established the NZDFI project in July 2008 under a Memorandum of Understanding with the NZDFI's founding partners; Proseed NZ Ltd, Vineyard Timbers Ltd and the University of Canterbury. Information about the partners can be found in Appendix Two.

The NZDFI Science Team is a group of University of Canterbury academic staff and numerous post-graduate students that work alongside Marlborough Research Centre consultants and the propagation research team at Proseed in Amberley. Together this team plans and manages the highly integrated the research programme (see nzdfi.org.nz/research-trials/).

The research programme is regularly reviewed by domestic and international experts from industry and academia, and now involves collaboration with researchers from Australia, Japan and Germany.

The NZDFI's research has been successful because we work closely with the 30 landowners who host NZDFI's extensive network of trials planted with 140,000 trees since 2009.

In addition there are many other stakeholders within NZDFI's wide community of interest. This includes numerous individuals plus farm forestry and forest industry organisations/companies and local government organisations that all actively support NZDFI's research programme.

Effective communication and extension to industry includes targeting the delivery of information and results from the NZDFI's research programme to the regions that offer the most opportunity.

MRC's NZDFI extension strategy is driven by the support and interest forged with the 30 landowners that own the trial sites; the many farm foresters and forest companies that have already started planting (see ***Appendix 3***); other forest industry organisations and east coast regional councils. Those who are part of NZDFI's 'community of interest' are working collaboratively to achieve NZDFI's vision.

NZDFI's research and knowledge is disseminated through regular Project Updates to the NZDFI contact list; updates posted to NZDFI web site www.nzdfi.org.nz ; refereed publications and articles written for industry sector publications such as NZ Tree Grower and academic journals; presentations delivered at the annual Forest Growers Research conference and other forest industry and rural sector workshops and field days.

3.4 Māori involvement and commitment to Vision Mātauranga

There are already Māori participants in NZDFI's R&D programme, these being Ngāi Tahu and Ngāti Tuwharetoa while Te Tumu Paeroa is an investor in the wider focus of the SWP programme.

Ngāi Tahu is directly involved as a founding partner of the NZDFI through their subsidiary company Proseed New Zealand Limited. This company is the largest Australian producer of improved radiata seed. Their CEO, Shaf van Ballekom, is also NZDFI chairman. In 2014, Proseed opened a new controlled-propagation facility to undertake propagation research followed by planting their first seed orchards of durable eucalypts in 2016.

Lake Taupō Forest Trust (Ngāti Tuwharetoa) has planted trials of durable eucalypts in order to diversify the species they grow. Their land will be in forest in perpetuity due to the nitrate issues in the Lake Taupō catchment. If successful after further trials, the Trust could scale up planting if sustainable market demand of sufficient scale is proven.

NZDFI support the Vision Mātauranga goal to unlock the potential of the Māori economy, and the Crown Māori Economic Growth Partnership, He kai kei aku ringa. Patterns of Māori forest ownership are changing. As land managed by other entities under Crown Forest Licences has reverted back to iwi, Māori forest ownership/management is approaching 40% of the total forested area. Māori are seeking options for early cash-flow, and to maximise returns from their land; these benefits could be delivered by our durable eucalypt species.

However, NZDFI recognize that Iwi are cautious investors. They cannot put either their land or their recent Treaty of Waitangi settlements at risk. So it is through this process of developing a regional strategic plan, NZDFI is seeking the leadership of appropriate government agencies to assist in broadening Māori engagement and to give them confidence to plant durable eucalypts on their lands.

3.5 Branding of NZDFI germplasm

NZDFI's partners have developed a strategy for branding the quality of germplasm captured within improved nursery stocks so that farm foresters and forest growers can select these plants to ensure high productivity and wood quality in their forests. To this end the XyloGene trademark has been registered with the International Property Office of New Zealand.

Figure 4. *The XyloGene brand.*

This trademark could be used for more than seed and seedlings. By planting forests with branded and certified improved nursery stocks, there is also the opportunity for future market traceability of the durable eucalypt hardwood grown in these forests. The logs could be tracked from the forest to the timber produced, and the XyloGene brand used as a certifying trademark to identify and differentiate all products including posts, poles, sawn timber and processed products such as veneers containing timber from XyloGene seedstock. Trademarks are critical to long term international export success and NZDFI's partners requests NZ's government consider how to develop this opportunity from the onset of a major planting programme.

4 THE PURPOSE OF NZDFI'S REGIONAL STRATEGIC PLAN

With the commercial release of improved planting stock planned for 2020, NZDFI partners and supporters want this regional strategic plan to increase the community of interest, and to build the industry capability needed, to plant 100,000 hectares of improved eucalypts. New Zealand's east coast regions can then become world-leading sustainable durable hardwood producers.

Given the new Government's plan to set up a NZ Forestry Service with a goal of planting 1 billion trees over the next ten years, the timing is opportune for NZDFI's partners to support this goal by encouraging Government investment in planting durable eucalypts on optimal sites in the east coast regions, at a scale that will deliver long-term regional economic and environmental benefits.

This paper has identified the possible value proposition that investment in durable eucalypt forestry offers, based on the current market evidence of imported hardwood timbers being worth more than twice the value of exported pine timber. The NZDFI has laid the foundations for providing a supply of improved planting stock, beginning in 2020.

From this point, efforts need to be focused on other critical elements needed to achieve its vision, including providing information on rotation length, productivity and product yields that give existing or new landowners confidence to invest in durable eucalypt forests, and to ensuring sufficient management knowledge and labour is available to plant and manage the forests.

However, the first big step is to get the best seedlings well-planted into optimal sites so as to successfully establish new eucalypt forests for the future. Therefore, we are keen to get feedback from others about how we can plan with them to do this together.

5 WHAT NEEDS TO BE DONE AND BY WHOM?

5.1 Developing growth models to encourage investment

Developing new plantation species requires long-term research. Despite 10 years of research by NZDFI, we have yet to capture sufficient data to be able to construct reliable growth and processing models similar to those available for radiata pine.

NZDFI's first regional value chain is most likely in Hawkes Bay/Gisborne regions and in Wairarapa based on short rotation forests that will commence in 2035 to supply small peeler logs to produce super-stiff LVL. This product has already been identified by Juken New Zealand Ltd, an integrated forestry and processing company based in both Gisborne (sawn timber) and Masterton (sawn timber and plywood and LVL). Juken NZ Ltd hosts several NZDFI trials, has played an active role in the NZDFI since 2011, and has planted several hundred hectares of durable eucalypt (with unimproved plants) over the past seven years.

There are other east coast forest growers and farm foresters, including Landcorp Farming and the Hawkes Bay Regional Council, who have been collaborating in NZDFI research. They have already started planting durable eucalypts and plan to increase this once improved planting stock is available so as to be first to market with NZ grown, high strength LVL and durable hardwood products.

Therefore, a major next step from here will be to develop an economic model for forestry investment in short rotation plantations to produce log supply for high strength LVL. This research work is planned to be carried out by NZDFI's research providers.

This model will be developed and expanded over time to evaluate potential returns for a range of durable eucalypt plantation investment options, based on a suitable analysis of the sites under consideration for planting.

5.2 Identifying sites suitable for growing durable eucalypts

With NZDFI's genetically improved durable eucalypt planting stock soon to be available, landowners with suitable sites who could be interested in becoming durable hardwood growers need to be contacted.

The new Government has already tasked Crown Forestry with setting up joint ventures with private landowners to plant new plantations as part of the One Billion Trees programme.

Crown Forestry is seeking landowners considering commercial radiata pine planting and who have blocks of land that:

- are a minimum size of 200 plantable hectares
- have not been plantation forest before
- have reasonable fertility
- have easy access within the block and to district roads and state highways
- have terrain suitable for current forest harvesting systems
- are identified as suitable for production forestry in the relevant district council and regional council land use and water plans
- if there are weeds, these can be controlled by aerial spraying.

While there are climate and soil drainage limitations for the various durable eucalypt species under research by NZDFI, these same broad requirements could be applied to identify sites for new durable eucalypt plantations in our target east coast regions.

In addition, NZDFI want to encourage smaller size durable eucalypt plantations; woodlots and shelterbelts due to the diversity of benefits these species offer if planted in farm environments.

These benefits include on farm production of posts, poles and timber for farm infrastructure with no treatment required; excellent firewood; nectar and pollen production; shelter and shade for stock. Some eucalypt species have been proven for remediation of waste water through use of spray irrigation in plantations and could have potential to strip nitrates from ground water if planted and harvested with care in riparian margins.

Durable eucalypts can live hundreds of years so could also be established as permanent forests on steep unproductive land for erosion control and to sequester carbon. The trees could be spaced widely to allow native planting or regeneration to also form the long term forest canopy.

5.3 Meeting labour requirements

In addition to providing a supply of durable eucalypt planting stock and land to establish, people will be needed to plant, manage, harvest and process the trees. As with all of NZ's primary sector industries, there is a significant shortage of labour to service New Zealand's forest industry, and NZDFI's partners are concerned that the lack of suitably skilled labour will be the primary constraint limiting the Government's new tree planting targets. Planting and managing eucalypts requires a different approach to pine, so not only are more people going to be needed, both existing and new entrants to the workforce will need to be trained.

Given the importance of a suitably trained workforce, we are also seeking feedback on current and possible future initiatives to build human capability as part of this strategic planning process.

5.4 Overcoming biological risks

NZDFI's partners understand there are significant biological risks that threaten the substantial capital investment that is required if 100,000 hectares of durable eucalypt plantations are to be established. These include climate and soil being unsuitable for the species chosen for any particular afforestation site; poor handling of nursery stock during establishment and incorrect timing of planting; despite genetic improvement some young eucalypt seedlings can develop poor form; insect pests and diseases and fire.

These risks can be mitigated through:

- careful site planning by farm foresters and forest growers so as to correctly match species to site. This could be significantly assisted through by upskilling regional council land managers, local forestry and farm management consultants. Also through the availability of a GIS-based on-line decision support tool that is under development
- completing establishment operations to a high standard which does require different methods to those used for planting pine
- form pruning (to create a single, straight stem) may be necessary to ensure optimal selection of crop trees

- integrated pest management strategies to combat the potential impacts of insect pests and possibly Myrtle rust on some NZDFI species. NZDFI research in pest management is already underway
- locating plantations and wood lots of durable eucalypts in sites with low fire risk and not establishing plantations in peri-urban areas.

A further public and landowner concern may be that durable eucalypts pose a threat of producing wildings (i.e. they will spread beyond plantation boundaries) and become an environmental nuisance. Despite many eucalypt species having been introduced into New Zealand and planted across a wide range of environments, they are not known to have developed wildings. This could be due to the specificity of sites that eucalypts require as well as the care required for establishment. Also eucalypt seed does not naturally disperse over long distances, so we consider the risk of eucalypt wildings is low.

6 REGIONAL STRATEGIC PLAN: DEVELOPMENT PROCESS

The following process is now underway, and this consultation paper is provided to enable you to provide feedback on our proposals:

Activity	Completion date
Draft a consultation paper and circulate to seek feedback from the individuals, organisations and companies listed in ***Appendix 4***.	In progress
Establish a working group to guide plan development by providing feedback (via an on-line questionnaire or phone interview with the NZDFI Programme Manager, Paul Millen) on the consultation paper and nominating a representative for the working group. The purpose of the working group is to engage representatives of the people and organisations that will be taking action or supporting implementation of the strategic plan.	31st March 2018
Review feedback and develop a proposal for feasibility analysis including developing an economic model to evaluate a high-stiffness durable eucalypt LVL regional value chain. Circulate proposal to working group for further feedback.	31st April 2018
Undertake research to complete feasibility analysis for LVL regional value chain including a preliminary economic model; assessment of capital and infrastructure requirements; and environmental management requirements. Report outcome of feasibility analysis to working group.	31st May 2018
Prepare a report presenting feasibility analysis and economic evaluation of potential regional value chains with recommendations on optimal size and area for forest establishment. Develop annual planting targets to establish a sustainable harvest of durable eucalypt logs able to supply each value chain. Circulate to working group for feedback.	30th June 2018
Review feedback and complete strategic plan with recommendations for collaborative action to commence regional scale planting programmes. Circulate plan to working group. Plan an extension programme and timetable to promote and implement strategic plan.	30th September 2018.
Implementation of regional strategic plan and extension programme.	Commence October 2018

7 QUESTIONS FOR FEEDBACK

(The following questions are available on-line, or if you prefer, send an e mail to Paul Millen, NZDFI's Project Manager (see p 19 for contact details).

1. Are you (or is your organisation) interested in actively supporting the NZDFI regional strategic plan development process and being a member of the working group?

2. If so, what is your (or your organisation's) main interest? Please rank in importance the potential outcomes that could result from the success of NZDFI's vision?

3. What action or contribution could you (or your organisation) take or make towards achieving these outcomes?

4. What do you (or your organisation) consider are the risks/barriers/knowledge gaps to long-term investment by landowners in planting and managing new eucalypt forests? Rank these in order of priority.

5. What action/information/resources would help mitigate these risks/barriers/knowledge gaps?

6. What scale of planting is needed in any one region to generate a sustainable industry?

7. What would be suitable target locations for new plantings, and what area of new plantations and woodlots (in total, and on individual properties) do you think could be planted annually?

8. Is there land available in the target locations you have identified suitable for growing eucalypts?

9. Who are the owners of the land with sites in the target locations suitable for planting new eucalypt forests? Do you have access to a database with their contact details?

10. What are the best ways to contact landowners in target locations and inform them about the opportunity to successfully establish and manage durable eucalypts?

11. Can you (or your organisation) assist with contacting and informing landowners? If so, how could you assist?

12. Do you (or your organisation) support central and/or regional government offering direct financial incentives (including low interest loans, grants or joint venture capital) to landowners to plant durable eucalypts within the target locations identified for each region? If so, what incentives will be most effective?

13. Do you (or your organisation) support central and/or regional government developing public/private extension services that promote the planting of durable eucalypts; provide woodlot/plantation planning and services including coordination and supervision of forest establishment?

14. Do you have any further feedback?

8 APPENDICES

APPENDIX 1: Excerpts from New Zealand Annual Forestry Statistics 30 June 2017

Source Ministry of Primary Industries https://catalogue.data.govt.nz/dataset?tags=forestry

TABLE ONE: Imported Forestry Products for year ended 30 June 2017	Quantity	Import Value (NZ$ c.i.f.)	Average unit value of timber import (NZ$ per m3)
Hardwood Timber			
Logs and poles (m^3)	4,486	$ 5,049,000	$ 1,125.50
Sleepers (m^3)	982	$ 806,000	$ 820.77
Sawn timber - hardwoods (m^3)	35,267	$ 43,628,000	$ 1,237.08
Total hardwood timber imports	**40,735**	**$ 49,483,000**	
Other forestry products			
Continuously shaped wood (mouldings, etc)		$ 39,292,000	
Wooden furniture and furniture parts		$ 360,753,000	
Total other forestry product imports		**$ 400,045,000**	

TABLE TWO: Exported Forestry Products for year ended 30 June 2017	Quantity	Export Value (NZ$ f.o.b.)	Average unit value of timber export (NZ$ per m3)
Logs and Wood chips			
Logs and poles (m3)	18,043,00	$ 269,132,800	$ 148.79
Wood chips (BDU)	286,865	$ 59,699,000	$ 208.11
Sawn Timber			
Radiata pine (m3)	1,704,000	$ 804,484,000	$ 472.12
Douglas-fir (m3)	24,000	$ 9,271,000	$ 386.29
Other planted production forest (m3)	17,000	$ 5,434,000	$ 319.65
Natural forest (m3)	290	$ 312,000	$ 1,075.86
Sleepers (m3)	77	$ 39,000	$ 506.49
Total sawn timber and sleepers exports	**1,745,367**	**$ 868,447,000**	
Panel products			
Plywood/LVL (m3)	61,385	$ 127,264,000	$ 2,073.21
Other panel products - fibreboard, veneer and particle board (m3)	757,398	$ 348,748,000	$ 460.46
Total panel product exports	**818,783**	**$ 476,012,000**	
Other forestry product exports			
Continuously shaped wood (mouldings, etc)		$ 100,516,000	
Manufactures of paper and paperboard		$ 208,871,000	
Wooden furniture and furniture parts		$ 25,700,000	
Miscellaneous forestry products		$ 62,660,000	
Total other forestry product exports		**$ 397,747,000**	

APPENDIX 2: NZDFI founding partners

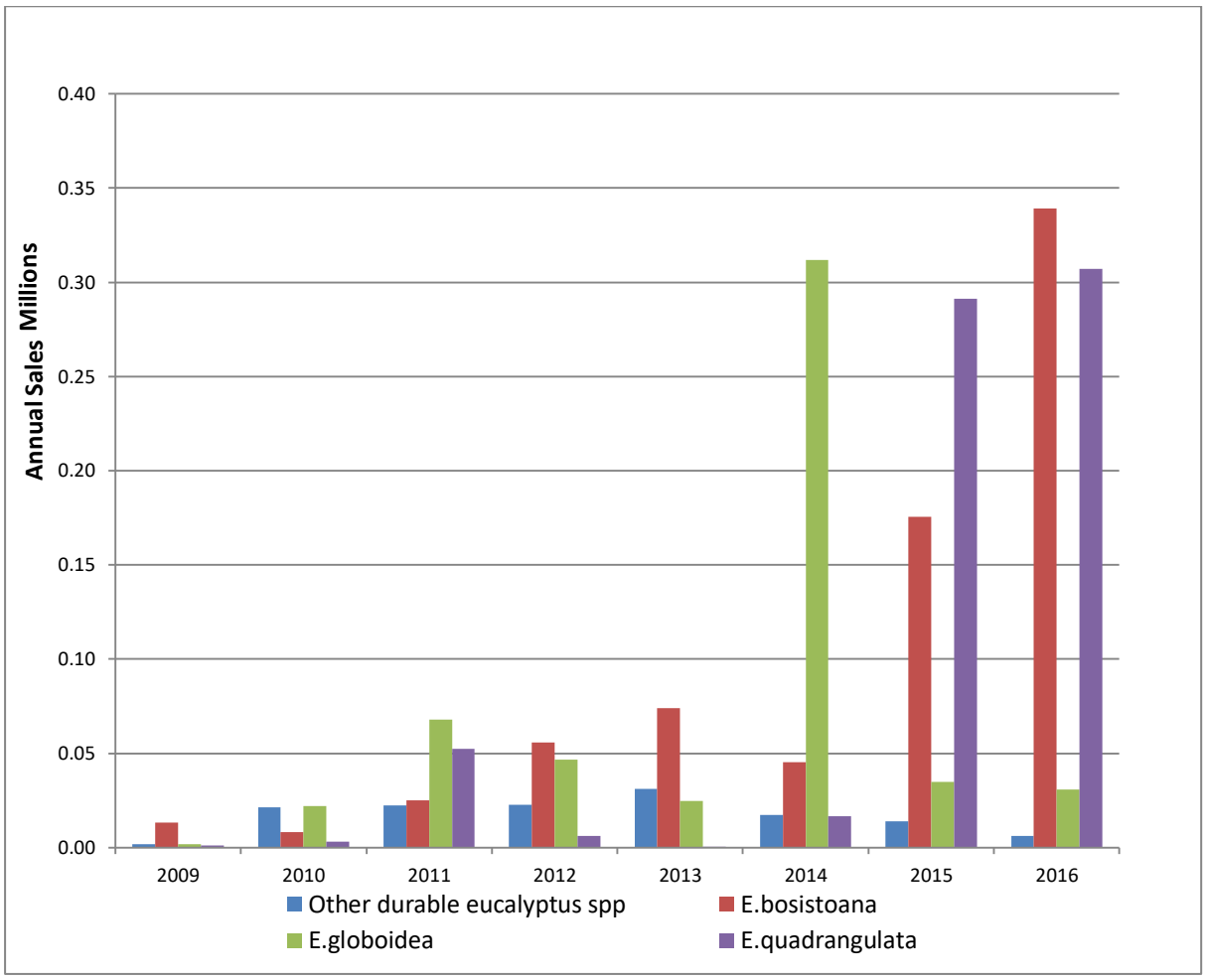
Marlborough Research Centre Trust provides NZDFI's governance and administration with Gerald Hope, (MRCT's Chief Executive), acting as NZDFI's financial manager. MRCT, a charitable organisation, is a facilitator and seed funder with a track record of over 30 years' involvement in connecting research and business to improve Marlborough's and New Zealand's economy.

Proseed NZ Ltd CEO, Shaf van Ballekom, chairs NZDFI's management team. Proseed (a Ngāi Tahu subsidiary) is based in Amberley, north Canterbury. With 200 hectares of seed orchards, it is the largest producer of genetically improved forest seed in Australasia.

University of Canterbury Head of the School of Forestry, Professor Bruce Manley, leads UC's experienced science team backed by a cohort of new PhD and MSc researchers with the skills necessary to advance NZDFI's vision.

Vineyard Timbers Ltd is a start-up company established by Paul Millen, a Marlborough forestry consultant with expertise in dryland forestry and durable eucalypts, 12 years ago. Paul is now NZDFI's Project Manager. He leads NZDFI work programme and is supported both by NZDFI's landowners who host durable eucalypt trials, and by NZDFI's expanding farmer/industry/regional council network.

APPENDIX 3: NZDFI nursery seedling production survey



Annual nursery seedlings sales statistics are collected by NZDFI to provide an indication of demand for durable eucalypt seedlings, and an estimate of the total area planted (>900ha by 2017).

APPENDIX 4: Individuals/organisations/companies to be consulted

Central Government

Ministry for Primary Industries

Ministry of Building Innovation and Employment

Regional Councils

Hawkes Bay Regional Council

Greater Wellington Regional Council

Horizons Regional Council

Gisborne District Council

Marlborough Regional Forests (Marlborough District Council)

Tasman District Council

SWP Forest Grower members

Blakely Pacific

City Forests

Ernslaw One Ltd

Juken NZ Ltd

Lake Taupo and Rotoaira Forest Trusts

Marlborough Lines

NZ Farm Forestry Association, National Office and local branches (Gisborne, Hawkes Bay, Wairarapa, Marlborough and Nelson).

Proseed NZ Ltd

Southwood Exports Ltd

Te Tumu Paeroa

Timberlands

Other NZDFI supporters

Farm foresters and forest managers who have planted NZDFI trials in east coast regions.

Other sector organisations to be invited to provide feedback include:

Apiculture New Zealand

Eastland Wood Council

Federated Farmers

Hawkes Bay Forestry Group

Landcorp Farming Ltd

Marlborough Forest Industry Association

Ngati Porou Forests Ltd

NZ Institute of Forestry

Organic Winegrowers NZ

Organics Aoteoroa NZ

Sustainable Winegrowers New Zealand

APPENDIX 5: Contacts for more information

The NZDFI has a comprehensive website: www.nzdfi.org.nz

For any further information, please contact Paul Millen, NZDFI Project Manager

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