Friday 28th February 2014
Frankford & Hillwood (Batman Bridge)

Profitable tree growing options on farms to improve land use and increase both agricultural productivity and profit primarily through shelter for stock and timber production

Field Day Notes
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**Disclaimer:**

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Acknowledgements

The contribution made by Adam Culley and Ed Archer to host this field day on their properties is gratefully acknowledged.

This field day has been organised by:

TFGA (Tamar Valley Branch)
Tamar Natural Resource Management (Tamar NRM)
Private Forests Tasmania
Australian Forest Growers (Tasmanian Branch)
Institute of Foresters Australia (Tasmanian Branch)
University of Tasmania and
AKS Forestry Solutions Pty Ltd

in conjunction with property owners, Adam Culley and Ed Archer.

Support and contribution by the sponsors is both acknowledged and appreciated:

TFGA (Tamar Valley Branch)

Formed in 1988, the Tamar Valley Branch of the Tasmanian Farmers and Graziers Association works closely with the TFGA, and CEO Jan Davis, on a range of issues raised by members. President Ian Sauer said, “Agriculture is important in the region. We want more agriculturalists and people from all walks of life to be part of the group, because of the value that can be added to discussions, debate and in the end policy.” The branch meets monthly, alternating between the West and East Tamar. People wishing to attend should ring Brian Baxter on 6382 7171.

Tamar Natural Resource Management (Tamar NRM)

www.tamarnrm.com.au

Formed in 1998, Tamar Natural Resource Management (Tamar NRM) in northern Tasmania is an independent, not-for-profit, natural resource management group which brings together a wide range of community, landcare, education, business, local and State Government representatives. It is nationally recognised for effective contribution to natural resource management through support, leadership and innovation. It is built upon a strong history of landcare and grass-roots involvement in environmental and agricultural issues in the Tamar Region. Encompassing the Launceston City, West Tamar and George Town municipalities, Tamar NRM plays an active role in working with others to facilitate and support a wide range of rural and urban activities to ensure Tamar Region is an attractive, healthy and prosperous place to live and work. Since 2000, Tamar NRM has attracted over $6M of funding into the region.

Australian Forest Growers (Tasmanian Branch)

www.afg.asn.au

Australian Forest Growers (AFG) is the only credible national association representing private forestry and commercial tree growing interests in Australia. If you grow trees in forests or on farms mainly for wood or non-wood products, or you would like to, AFG can help you. AFG is run by voluntary Board of growers and professional staff in Canberra and Branch committees. AFG has branches in all states.
Private Forests Tasmania
www.privateforests.tas.gov.au

Private Forests Tasmania was established in 1994 as a statutory authority under the *Private Forests Act* (1994), and is funded by the Tasmanian Government and private forest owners. Private Forests Tasmania promotes, fosters and assists the private forestry sector on forestry matters, provides strategic and policy advice to Government and represents Tasmanian private forest owners’ interests nationally. Private Forests Tasmania facilitates development of the private forest resource consistent with sound forest and land management practices. This includes advising and assisting private landowners in the sustainable management of native forests and the establishment and management of plantations on private land.

Institute of Foresters Australia (Tasmanian Branch)
www.forestry.org.au

Established in 1935, the Institute of Foresters of Australia is Australia’s only professional body with over 1200 members engaged in all branches of forest management and conservation in Australia and internationally. The Institute is strongly committed to the principles of sustainable forest management and the processes and practices which translate these principles into outcomes.

AKS Forest Solutions Pty Ltd
astonjek@bigpond.net.au

A well-established Tasmanian forest management company providing complete solutions from the forest to the market. AKS aims to optimise outcomes for private forest owners. AKS covers all aspects of forestry and forests: plantations and natural forest; from establishment, forest management, harvesting and markets. Importantly, AKS has AFS Certification.

University of Tasmania
www.utas.edu.au

The School of Land and Food combines the previous Schools of Agricultural Science / TIA and Geography and Environmental Studies and offers postgraduate and undergraduate degree and research programs statewide across all three university campuses in Hobart, Launceston and Burnie. In Launceston, the school offers teaching and research programs in the physical and environmental sciences including Agroforestry and other sub-disciplines of land, resources and environmental management.

Also thank you to:
- TFGA (Tamar Valley Branch) for sponsoring and catering the BBQ lunch.
- ASK Forest Solutions Pty Ltd for sponsoring morning tea.
- Private Forests Tasmania, Australian Forest Growers and Institute of Foresters for sponsorship.
- MC’s Roger Tyshing and Ian Sauer.
- Authors of the field day notes:
  - Private Forest Tasmania staff: Arthur Lyons, David Bower, Rob Smith and Henry Chan and Greg Unwin, University of Tasmania.
- Amanda Bruce for designing, compiling and printing the field day notes.
- Mark Leech, Chair, Board of Private Forests Tasmania for the summation and
- Senator Richard Colbeck, Parliamentary Secretary to the Minister for Agriculture, Senator for Tasmania for the closing presentation.
Program

Stop 1 - Property of Adam Culley, Frankford Road

From 9:00
Registration

9:20 – 9:35
Welcome and Introduction

9:35 – 9:50
My Story – Adam Culley

9:50 – 10.20
Pine - Establishment, management and costs & returns

10:20 – 10:35
Morning Tea (provided by AKS Forestry Solutions)

10:40 – 10:55
Wind Risk

10:55 – 11:10
Harvesting (AKS Forestry Solutions Pty Ltd)

11:15 – 11:30
 Cypress - Management, wood properties and markets

11:35 – 12:10
Eucalypt - Management and markets

12:10 – 12:15
Close

Stop 2 - ‘Greenthythe’ Archers Road, Hillwood

12:55– 1:25
Lunch

1:25 – 1:30
Welcome and Introduction

1:30 -1:55
'Design and benefits of tree shelter on farms' - Greg Unwin, Adjunct Senior Lecturer (Forest Ecosystems/ Agroforestry), School of Land and Food, University of Tasmania

2:00 – 2:20
My Story – Ed Archer

2:20 – 2:40
Shelterbelt E. nitens – Species selection, tree performance, shelter benefits and future management

2:45 – 3:15
Shelterbelt E. globulus – Species selection, tree performance, shelter benefits, future management (harvest, coppice, sawlog production and shelter)

3:15 – 3:25
'Lessons Learnt' (Mark Leech, Chairman, Board of Private Forests Tasmania)

3:25 – 3:50
Closing Presentation - Senator Richard Colbeck
Parliamentary Secretary to the Minister for Agriculture Senator for Tasmania

3:50 – 4:00
Close
Locality Map

Please look for 'Field Day' signs

Stop 2 - Property of Ed Archer, Archers Road, Hillwood.

Stop 1 - Property of Adam Culley, Frankford Road, (next to Frankford Cemetery).

Note: Please take care when exiting onto Frankford Road, as visibility is poor.
Property of
Adam Culley
Frankford
My Story - Adam Culley

Getting started.......... It all started on our 11 acre Notley Hills property. John Quick, my father in law, who was with Forestry Tasmania, suggested my wife Fiona and I try our hand at growing trees for our superannuation. And with help from Private Forests Tasmania we did. Initially we had some challenges with trees toppling but we replanted and established a plantation with a mixture of pine, cypress and E. nitens. Fiona and I moved on from there. We looked at our options and decided to invest further in trees as part of our superannuation. John said ‘anywhere that E. obliqua grows you can grow radiata pine’. So we looked around for some suitable land.

Getting serious.........
We bought 40 acres of partly forested land at Frankford in 2000. We harvested a small section of about 2 acres of native forest which paid for ripping and mounding for the new plantings. Then we started planting. We knew radiata pine would be the dominant species but we tried some E. nitens and cypress to hedge our bets.

We weren’t exactly sure what products we could produce from the E. nitens. At the time FEA were milling E. nitens and on Private Forest Tasmania’s advice we pruned and thinned the E. nitens early and in quick succession. The cypress was a long term option and an experiment to see if we could grow high value timber. The pine was a straightforward 28 -30 year forestry option for which we expected a return on our investment.

The planting was done in two stages, the first in 2001, primarily 6ha of pine and also E. nitens. The harvested native forest area was planted to pine in 2002. That year we also planted cypress cuttings of Strathallan and Kukupa clones to minimise the threat of cypress canker. We planted them alternately down the rows and this has proved a wise move. All planting, at about 1,200 trees per hectare, was completed in 2002. We also fertilized and sprayed for weed control with glyphosate, simazine and atrazine. We were off to a good start.

We deep ripped around the boundary fence to prevent the mature gum trees along the boundary impacting on our young trees.

We did not want to use 1080 to control native browsing animals as we had a nasty experience at Notley Hills where one of the neighbour’s dogs was poisoned. So we put second hand iron roofing around the 1.5 kilometre perimeter fence which cost about $1 per sheet. It really served its purpose well as we deliberately splayed it onto the ground to make it difficult for animals to burrow into the plantation. There was little evidence of burrowing. Nearly all browsing animals were kept out even though the odd larger wallabies jumped over the fence. Rabbits were an endemic problem early on but the pines survived and grew well. The plantation was well established.

The cypress rows were spaced at 5.0m apart and therefore the trees within rows were planted about 1.8m apart. This was not ideal at the time but we have progressively removed canker infected trees so the more canker tolerant trees remain. This spacing may well enable a potential reasonably uniformly distributed final stocking of about 100 trees per hectare – trees will be nominally spaced at 10 X 10 m.
Management with a purpose

We pruned in stages to specified standards and thinned early to grow the pruned trees quickly.

The original *E. nitens* were pruned and thinned in November 2004 and the second section was done in 2005. In June 2006 the initial 8 ha of pine was pruned and in October the whole plantation was fertilized by contractors. In November 2006 we cut out every second or third tree of the 2ha of *E. nitens*. Later that year we pruned the *E. nitens* to 4.3m and we non-commercially thinned early to maximise the tree growth. In hindsight this was a good move because with our recent experience with windthrow the *E. nitens* stood up well and only a few trees were windblown.

The 2002 pine was also thinned early and we took out every third tree. This area withstood the wind even though it is in a high wind risk area and there has only been minimal loss. It is not a fertile area and there has been more competition from native plants because of the thinning. Even so, the trees are growing well and over time they will improve. The final lifts were done on the *E. nitens* in 2008 and the pine in 2009 and 2010.

We have pruned the cypress according to diameter and height specifications. Any tree with canker we removed. We have cut out primarily the Strathallan clone as its acute branch structure seems to make it more susceptible to canker. Observations show the Kukupa clone to be most resistant to canker. We planted about 20 *Cupressus lusitanica* (Mexican Cypress) and these trees, contrary to what was expected, showed both susceptibility and resistance to canker and the dry summers and seed source may have something to do with this.

Our first returns

In June 2013, AKS Forest Solutions did the first commercial thinning of the pine and eucalypts. Tony Stonjek, his boys and the contractor, Adam Walters, did a fantastic job and we were really happy.

Some challenges

We have not had any issues with fire, but that’s not to say it won’t happen. The plantation location, the adjacent public road, our firebreaks and our mulching and rotary hoeing will help protect our plantation from fire. A Hydro easement which divides the plantation in half provides useful access and a substantial internal firebreak.

The unfortunate windthrow in Spring 2013 following thinning was a result of the combination of very strong winds and an unseasonably wet winter. Maybe up to 50% of our potential final crop trees have been affected to some degree, but we will have to live with that. To me forestry is just another form of farming, susceptible to the elements outside of our control.

We will continue to work with Private Forest Tasmania and look for the optimum time for the next commercial thinning of the pines. Some wind thrown areas will not need thinning but other areas will. We have to decide how we will manage the *E. nitens* because they are getting big quickly and will be ready to harvest five or so years before the pine. What exactly the *E. nitens* will be sold for is unknown and hopeful technology will provide some opportunities. The cypress is a long term venture and we are looking to harvest them when they are about 40 years of age. We recognise that cypress is a special timber.
Our initial plan was to grow pine and eucalypt timber for rotary peeling. The cypress was envisioned for specialist furniture timber and the value of the timber would offset the longer growing time. Markets change and ultimately we are trying to achieve the greatest momentary value from the timber harvested while balancing this against our cost inputs.

PFT has been monitoring the plantation to assist improve the modelling capability of the Farm Forestry Toolbox. I’m pleased we can assist here. As a result, I am receiving useful information to assist me make informed decisions about plantation management. We have obtained Australian Forest Growers’ Pruned Stand Certification on the second and third pruning lifts so as to have independent third party certification testifying of the quality of the products we are growing. I hope this will provide a greater return when we sell the timber as the buyer will know what he is getting.

I have sawn timber with a portable saw mill including celery top pine flooring for a house we built. We also cut a lot of joists. We have had milled cypress and celery top here using a New Zealand portable mill. We were pleased with the result. The sad thing for us was when we were away someone stole 30 to 50% of the timber worth up to $5,000 to $10,000. I’m sure we could value add when I’m older and have more time.

My advice to others............

- Firstly to decide what end result you want. Our objective is to invest in superannuation. If you are a farmer interested in shelterbelts that’s something different again. If you do not what to take any risks, invest in government bonds. We have taken a risk and whether this will be justified I do not know. I’m not sure if we will get a higher return for that risk. At the end of the day the land will increase in value if nothing else – in fact it has already doubled in value.
- Learn about forestry. Learn as much as you can from the experience and knowledge of others, seek professional advice and make informed decisions.
- Pay attention to existing and future markets, as the management decisions you make today will determine the type of products you have to sell tomorrow.
- Enjoy what you do. I have enjoyed this venture. Although I have not done all the pruning I have really enjoyed what I have done. Every time I visit our plantation I look around and really appreciate what we have done. I also love working with timber and farm forestry is more than just about dollars and cents. It’s a ‘mind thing’ and at the same time I feel I am doing something for the environment as well.

At this field day, I’m sure I will learn as much from you, as you will learn from me. I am pleased I am able to contribute in this way and that you have you have visited my plantation. I do hope your forestry ventures are successful.
Field Day Map and Stops
Growing Pine and Eucalypt Plantations for Timber

Property of Adam Culley - Frankford

Plantation Establishment & Management

David Bower, Private Forest Advisor, Private Forests Tasmania

There are a few key questions to ask yourself before slipping on your ‘Blundstones’ and heading out to plant a few trees.

- Key questions begin with; why?, what?, where? and how?
- What resources are available and what is my capacity to implement works?
- Do I have a whole of property plan?

Sometimes forestry is largely about juggling a number of influential, often competing factors to achieve a desired outcome or objective. The challenge is to get the balance right, with an acceptable compromise.

Site Selection

Considerations include: rainfall (available moisture), soil physical and chemical properties, drainage, stoniness, wind risk etc.

What areas of the farm need shelter? Are there steeper or no-productive areas which could grow trees?

Am I investing for the future? Where will trees grow best?

Matching Species to Site

Proximity to markets or processors (e.g. sawmills and or pulp mills)

Site factors may place limits on which species would be successful if planted.

(At Frankford. Mean annual rainfall is 1,050mm. The geology is Permian mudstone, sandstone and conglomerate).

Compliance

Considerations:

- Local government planning scheme requirements.
- Forest Practices Legislation. A Forest Practices Plan (FPP) may be required.
- Identify easements for power lines, gas pipelines, NBN, reserved roads etc.

Site preparation

- Weed management is the most crucial of all site preparation works. Control of weeds pre-cultivation, pre-plant and 2 to 3 years post plant is critical for successful plantation establishment.
- Seed bed preparation improves establishment and early growth for all crops. Ripping and mounding is standard plantation forestry practice. Spot cultivation is undertaken on more difficult sites or sensitive areas and on many second rotation sites.
- Browsing damage risk needs to be assessed in advance of planting and measures undertaken to manage populations well before the trees are planted. Tree guards or degradable ‘socks’ may need to be employed at planting.
• **Nursery stock** needs to be ordered well in advance. This is best done in the Spring prior to planting. Purchase good quality seedlings of the **best genetics** your hard earned money can buy. Either plan to plant trees yourself or **engage a professional planting crew well in advance**.

• **Fertilizer is usually applied** as slow release at planting, or traditional fertilizer applied in early Spring (buried at least 20cm from the base of the seedling on the downhill side).

![Planting trees into a well prepared site](image)

**Management**

Trees established on the farm will eventually become either an asset or a liability, for current or future generations. If trees are to become an asset, planning and timely management are essential.

![An unmanaged shelterbelt past its ‘use by’ date](image)
Monitoring of pests, diseases and nutritional needs should be undertaken on an ongoing and regular basis.

There are two major strategies when considering plantation management options:

1. **Pulpwood Strategy** = Manage for maximum volume of wood.
   - Large number of stems per ha (sph).
   - Usually shorter rotation length – 12 to 18 years from planting to harvest.
   - Pulpwood is usually grown to a target volume per ha.
   - Lower stumpages when wood is sold.

2. **Sawlog and Veneer Strategy** = Manage for target or maximum log diameters.
   - Smaller number of stems per ha (sph) which grow large diameter logs quickly.
   - Usually longer rotation length – 25 to 40 years.
   - Sawlogs are usually grown to a target diameter and log length.
   - High value products and higher stumpages.
   - The choice is to produce either knotty sawlogs or knot free timber (clearwood).
   - Targets:
     - Knotty sawlogs: diameter > 45cm.
     - Clearwood log diameter = 60cm (and approximately 6m in length).

Adam Culley has chosen to produce high value clearwood. **Knot free timber (clearwood) is produced by pruning off live branches.** This is usually undertaken over 3 pruning visits or lifts, between ages 5 and 10 years for pine, and between ages 3 and 7 years for eucalypts.

The balancing act is to minimize the defect core of the log while not removing too much of the green engine which drives tree growth. Aim to maintain at least 40% of green crown, or 3-4 m of crown depth, at any pruning visit.

Example: Second lift pruning of *E. nitens* at Rosevale
Once the pruning wounds have occluded, the wood laid down thereafter, as the tree diameter increases, is knot free.

**In order to maximize diameter growth, sawlog plantations need to be thinned** in a planned and timely manner, with a ‘final crop’ of 150 to 350 stems per hectare (sph).

*Why do we initially plant 1000 to 1200 sph?*

*Why not just plant the required number of ‘final crop’ trees?*

*We go back to forestry as being a ‘juggling act’.......*

- Not all planted trees have the potential to become sawlogs, just as not all of us could qualify as Olympic sprinters. Usually, choosing 1 in 3 or 1 in 4 trees produces sufficient sawlogs on a site. **The odds are much better for clonally propagated trees.**
- Site occupancy and early canopy closure will reduce competition from weed species and assist in good early establishment.
- High initial stockings force trees to grow tall and straight with small branches. Large side branches reduce timber quality. The aim is to restrict branch size and maintain good form, while not restricting diameter growth through competition from adjacent trees. Shade from adjacent trees also hastens the dying off of lower branches.
- Non-commercial thinning (NCT) will cost money. Commercial thinning will generate money now.
- Delaying thinning may increase the risk of windthrow. Earlier NCT may increase wind firmness.

Example: Commercial outrow thinning of *E. nitens* at Blackwood Creek
Radiata pine

Radiata pine is a proven performer on most well drained sites, above 600mm annual rainfall and below 700m altitude, across Tasmania. It is able to be sawn, peeled, sliced, treated for durability, and chipped to produce paper of lower quality. The Frankford site appears well suited to growing Radiata pine - wind risk aside.
Productivity – How well are trees performing?

Table 1: Adam Culley’s Plantation – Summary of Plantation Growth - ex 2013 Measurement Plots.

<table>
<thead>
<tr>
<th>Plantation Species</th>
<th>Year Planted</th>
<th>Age (years)</th>
<th>Initial tree stocking (Stems/ha or sph)</th>
<th>Current tree stocking (Stems/ha or sph)</th>
<th>Diameter DBHOB av (cm)</th>
<th>Height MDH (m)</th>
<th>Basal Area BA (m²/ha)</th>
<th>Standing Volume (m³/ha)</th>
<th>Growth MAI (m³/ha)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinus radiata</td>
<td>2001</td>
<td>12</td>
<td>1200</td>
<td>1200</td>
<td>20.5</td>
<td>21.5</td>
<td>45.5</td>
<td>280 - 330</td>
<td>23 - 28</td>
<td>Average of 3 plots (unthinned)</td>
</tr>
<tr>
<td>Pinus radiata</td>
<td>2001</td>
<td>12</td>
<td>1200</td>
<td>400</td>
<td>22.0</td>
<td>19</td>
<td>16.0</td>
<td>100</td>
<td>8.5</td>
<td>Plot near entrance (post thin 2013)</td>
</tr>
<tr>
<td>Cupressus macrocarpa</td>
<td>2001</td>
<td>12</td>
<td>1200 approx.</td>
<td>580</td>
<td>15.5</td>
<td>10.5</td>
<td>11.7</td>
<td>41</td>
<td>3.5</td>
<td>NCT</td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>2001</td>
<td>12</td>
<td>1200 approx</td>
<td>580</td>
<td>?</td>
<td>19.5</td>
<td>23.5</td>
<td>150</td>
<td>13.0</td>
<td>Pre thin - 2013 (modelled)</td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>2001</td>
<td>12</td>
<td>1200 approx</td>
<td>250</td>
<td>24.5</td>
<td>19.5</td>
<td>12.5</td>
<td>80</td>
<td>7.0</td>
<td>Post thin - 2013 (final crop)</td>
</tr>
</tbody>
</table>

Note: These figures are indicative only and best used to make comparisons. They are specific to site. They should not be relied upon for their absolute values. Seek professional advice.
Table 2: Adam Culley’s Plantation – Economics (Farm Forestry Toolbox estimates)

<table>
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<tr>
<th>Plantation Species</th>
<th>Regime</th>
<th>Thinning</th>
<th>Rotation (years)</th>
<th>Basic Costs ($ 2014)</th>
<th>Returns ($ 2014)</th>
<th>IRR (%)</th>
<th>NPV ($/ha)</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td>Pinus radiata</td>
<td>250PRhiocomthin30</td>
<td>2x Commercial</td>
<td>30</td>
<td>$3 000</td>
<td>$26 000</td>
<td>9% -10%</td>
<td>$3800- $4500</td>
<td>COMPARES WELL WITH ‘REAL FIGURES’ – SEE TABLE 3 BELOW</td>
</tr>
<tr>
<td>Cupressus macrocarpa</td>
<td>NCT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>250Eucveneer30lopopulp</td>
<td>1x NCT &amp; 1x commercial</td>
<td>30</td>
<td>$3500</td>
<td>$7900</td>
<td>3.8%</td>
<td>-$650</td>
<td>Veneer: $70 per m³ Pulp: $10 per tonne -LOW PULP PRICES</td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>250Eucveneer30lopopulp</td>
<td>1x NCT &amp; 1x commercial</td>
<td>30</td>
<td>$3500</td>
<td>$12800</td>
<td>5.7%</td>
<td>$470</td>
<td>Veneer: $70 per m³ Pulp: $25 per tonne</td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>250Eucveneer35</td>
<td>1x NCT &amp; 1x commercial</td>
<td>35</td>
<td>$3500</td>
<td>$15200</td>
<td>5.3%</td>
<td>$270</td>
<td>Veneer: $70 per m³ Pulp: $25 per tonne</td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>Eucpulp 15</td>
<td>Nil</td>
<td>15</td>
<td>$1250</td>
<td>$2400</td>
<td>5.5%</td>
<td>$70</td>
<td>Pulp: $10 per tonne</td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>Eucpulp 18</td>
<td>Nil</td>
<td>18</td>
<td>$1250</td>
<td>$3150</td>
<td>6.1%</td>
<td>$204</td>
<td>Pulp: $10 per tonne</td>
</tr>
<tr>
<td>Eucalyptus nitens</td>
<td>Eucpulp 18</td>
<td>Nil</td>
<td>18</td>
<td>$1250</td>
<td>$7800</td>
<td>12.0%</td>
<td>$2100</td>
<td>Pulp: $25 per tonne</td>
</tr>
</tbody>
</table>

Note: These figures are indicative only and best used to make comparisons. They are specific to site. They should not be relied upon for their absolute values. Seek professional advice.
Table 3: Real Returns in 2011 ($/ha) for a Plantation at Notley Hills (<10km away).

Average yield = 700 m³/ha. Average MAI = 22 m³/ha/yr.

<table>
<thead>
<tr>
<th>Plantation Species</th>
<th>Regime</th>
<th>Stocking (sph)</th>
<th>Rotation (years)</th>
<th>Products</th>
<th>Stumpage $/m³ or $/tonne</th>
<th>Percentage of total volume (%)</th>
<th>Returns ($/ha in 2011 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pinus radiata</em></td>
<td>Clearwood / Knotty Sawlog</td>
<td>320 - 600</td>
<td>31-32</td>
<td>Pruned</td>
<td>$100</td>
<td>10%</td>
<td>$7 000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C1( knotty)</td>
<td>$45</td>
<td>60%</td>
<td>$18 900</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C2( knotty)</td>
<td>$25</td>
<td>15%</td>
<td>$2 625</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pulp</td>
<td>$4</td>
<td>15%</td>
<td>$420</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong> $28 950</td>
</tr>
</tbody>
</table>

**Market trends - Radiata pine**

- The market for pine sawlog is strong and reliable.
- The market for pine pulpwood is unreliable, with low stumpages paid to growers - if the wood can be sold at all.
- The recovery of sawlog grade material from clearfall is high – often > 80%.

**Conclusions**

- While the rotation length for sawlog products is longer, the potential return on investment is good for radiata pine at Frankford.
- With due care and consideration of wind risk, this is a good site for growing radiata pine (i.e. good growth rates and close to reliable markets).
**Eucalyptus nitens** (Shinning gum)

At a time when young plantation hardwood logs (12-18 year old) were being milled in the Tamar valley and marketed as ‘Ecoash’, Adam Culley’s original intention was to produce clearwood sawlog and/or veneer. With major timber companies and Forestry Tasmania all pruning *Eucalyptus nitens* at the time, it sent strong signals that there was a good future for sawn plantation grown hardwood. Adam initially, and has continually, sought professional advice and in light of current and emerging markets he decided to grow Eucalypt clearwood.

Today there is no commercial sawing, drying and marketing of plantation grown eucalypts in Tasmania. Sources within Forestry Tasmania are suggesting that:
- There may be a future in peeling *Eucalyptus nitens* for timber veneers and plywood.
- Product trials sawing older wood (+/-25 year old) have been encouraging.
- Greater recovery and a more versatile product range are achieved through peeling as opposed to sawing.

**The proposed** Frankford *Eucalyptus nitens* regime:-
- Plant 1000 – 1200 trees per ha.
- Three (3) pruning lifts to at least 6m in height.
- A commercial thinning at age 8 to 10 years.
- A second thinning, or clearfall, at 15 or 16 years depending on markets.
- Clearfall at around age 25 to 30 years, depending on previous silviculture.

Around 2006, the stand experienced crown lift as lower branches died off and the crowns thinned out – the stand was under moisture stress.

**The actual** Frankford *Eucalyptus nitens* regime after a review in 2006:-
- A non-commercial thinning (thin to waste), at age 4, years to around 550sph.
- A commercial thinning at age 12 years (for pulpwood) down to around 250 sph.
- Clearfall at around age 25 to 30 years?

**Costs and Returns**
See Tables 1 and 2.

**Conclusions**
- While soil and nutritional limitations may impact on the volume of wood produced, eucalypts should grow well on the Frankford site.
- The collapse of stumpages paid for eucalypt pulpwod has had a substantial impact on the profitability of growing eucalypt sawlogs, as well as pulpwod crops.
Strong winds can damage plantations that are; overdue for thinning, thinned late or exposed to combinations of very wet soil and strong winds. Trees may be blown over, toppled, bent or broken off resulting in considerable financial loss.

Private Forests Tasmania has developed a method to assess the potential risk of wind damage either when plantations are planned or harvesting operations are proposed. This case study illustrates the practical use of Wind Risk assessment.

Landowner, Adam Culley established a plantation for timber production in 1999, with assistance and guidance of Private Forests Tasmania staff.

The pine plantations have been maintained and managed using standard plantation prescriptions for a quality sawlog regime, including high-lift pruning but no thin-to-waste operation.

**Property Plantation Plan**

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**Property Facts**

- **Name:** Beasley’s Road
- **Location:** Frankford Rd, Frankford, Enterprise: Timber production
- **Property size:** 15 ha
- **Average rainfall:** 1 050 mm/yr
- **Soil types:** Duplex soils – sandy loamy, light clays over sandstone
- **Project:** Establishment of 10 hectares of *Pinus radiata*, *Eucalyptus nitens* and *Cupressus macrocarpa* circa 1999. *P. radiata* was commercially thinned in autumn-winter 2013. (The eucalypts were non-commercially thinned and later commercially thinned. The cypress was progressively non-commercially thinned from a young age).
In 2013 it was decided that the trees had reached a size for a commercial thinning operation to be conducted and the potential final-crop trees would benefit from a reduction in competition.

Satellite images of Adam Culley’s property:
- Image above shows stand before thinning. (Image from the LIST).
- Image below shows the area after-thinning. Clearly the pine trees are less densely stocked. (Image from BING maps).

During autumn-early winter 2013:
- The pines were first thinned from 1,000 to 550 stems per hectare (sph).
- The eucalypts were thinned from 550 to 250 -300 sph having been non-commercially thinned at age 4 from 1,200 to 550 sph.

Thinning operations were suspended in their final stages due to excessive rainfall causing the soil to become saturated and difficult for harvesting machinery to operate. The harvesting was completed later when the ground was trafficable.

During late-winter and early spring the thinned plantation experienced some peak wind events, that resulted in both windthrow and wind-snap of the pines. The area of significant windthrow was amongst the pines in the south-east section of the property. (The eucalypts
and cypresses suffered relatively very minor windthrow because they were more stable having been thinned earlier and their larger root plates provided anchorage to the ground).

A Forest Wind Risk assessment was not conducted when the thinning was planned. This situation provided Private Forests Tasmania the opportunity to put the Wind Risk assessment to the test and an assessment was undertaken in January 2014 to ascertain the Forest Wind Risk Class (FWRC) and to better understand why the windthrow occurred.

The assessment is undertaken on the ground using a compass and clinometer. It is straightforward and can be done by most people.
Eight plots were located across the property to gain a representative Wind Risk assessment.
The Wind Risk assessment estimates:
- Windthrow Hazard Class (WHC) - the likelihood of windthrow damage.
- Forest Stand Hazard Class (FSHC) - the endemic characteristics of stands of trees and forests that affect wind firmness.
- Forest Treatment Hazard Class (FSHC) - the wind load on an individual tree caused by an operation.

Scores for each of these three classes are combined to produce a Forest Wind Risk Class (FWRC) – a relative estimate of the wind risk. The WHC is increased by a factor of 2 to reflect the local conditions. The majority of the area is classed as Moderate FWRC, with the southern ridgeline being High FWRC.

Definitions of wind risk

**Moderate forest wind risk** - moderate wind force and a moderate resistance to overturning. Located where either poor anchorage and low wind force, or good anchorage and a high wind force are present. Wind damage could affect the outcome of operational treatments and should be considered.

**High forest wind risk** - high wind force and low resistance to overturning. Located where poor root anchorage occurs, where high wind speeds and turbulence are more likely to occur and where the stand structure, composition and tree form make it more liable to wind damage if openings are made. Wind damage is likely to occur at some time during the rotation and must
be considered carefully during the formulation of strategic plans and site-specific prescriptions.

**Reasons for windthrow:**
Possible reasons for the pattern and intensity of the windthrow include:
1. The intensity of the thinning operation created a rapid opening of the canopy (high roughness);
2. Inherent morphology of pines renders them more susceptible to catching the wind, whereas the eucalypts are inherently more windfirm;
3. The pines relatively high height/crown/tree diameter (DBH) ratio and the cypresses more favourable relative height/spacing;
4. The absence of a thin-to-waste operation;
5. Very high rainfall causing soil saturation, leading to a much reduced soil tear strength; and
6. A peak wind event.

The concentration of the significant windthrow in the south-east is probably due to:
1. The shelter afforded to the pines in the north by the roadside native trees;
2. Maximum soil saturation; and
3. Possible wind funnelling by the power-line easement on the leeward side of the ridge through the property.

**Recommendations:**
1. Any follow-up operations should not decrease the windfirmness of the remaining trees;
2. Where practicable and viable, the leaning trees should be retained; and
3. Operations should be light and gradual to allow the retained trees to regain their windfirmness, usually over a period of 18 months – 2 years.

**Principles to reduce forest wind risk - windthrow management strategies**
The following section has been adapted from Strathers et al *Windthrow Handbook for British Columbia Forests* 1994:

**Partial cutting and thinning**
1. Group selection, thinning, shelterwood and strip falling must be used with caution in high hazard areas.
2. Reserves should be located on low hazard areas.
3. Thin from below in shelterwood and thinning operations. Avoid gaps greater than half tree length.
4. Avoid selective, shelterwood and thinning harvests at clearfall edges, leave a buffer.
5. Trees with damaged roots should be removed.
6. If windthrow occurs, re-evaluate the wind risk of the remaining trees and decide to:
   (a) Clearfall,
   (b) Salvage windthrow and remaining trees or
   (c) leave the windthrow.
7. Relative spacing (i.e. Average tree spacing ÷ Mean dominant height) should be kept around the optimum value of 0.33.
8. Relative height (i.e. Mean dominant height ÷ Average diameter at breast height) should be kept around 40.

**Regeneration and forest maintenance**

1. Early re-spacing on moderate-to-high hazard sites, or maintain a dense stand for the rotation.
2. A series of light re-spacings or thinnings on high hazard sites.
3. Delay fertilising after re-spacing or thinning.
4. Draining wet sites will improve root-soil resistance.
5. In high hazard areas where immature forests are wind-thrown by endemic winds, consider developing harvesting schedules based on mean dominant height.

   Note: The determination of threshold tree heights for Tasmanian species and conditions is currently under investigation.

**Basic strategies for regenerating windfirm stands on moderate to high hazard sites include:**

1. Grow trees at wide spacing and no thinning.
2. Grow trees at medium spacing by planting at medium spacing or using early thinning.
3. Grow trees at close spacing and harvesting at onset of windthrow or at a predetermined height.
4. Relative height (i.e. Mean dominant height ÷ Average diameter at breast height) should be kept around 40.
5. Relative spacing (i.e. Average tree spacing ÷ Mean dominant height) should be kept around the optimum value of 0.33.
Harvesting
Tony Stonjek, AKS Forest Solutions Pty Ltd

Director Tony Stonjek has given up his time today to better explain the intricacies of what is involved to undertake harvesting and in this discussion, the thinning of small private woodlots such as the one we are visiting today.

AKS has recently attained, at quite an outlay of not only time but financially as well, AFS Certification. This will allow small independent growers that wish to engage AKS, to have the security of not only accessing market opportunities as they appear, but also knowing they are selling their wood under a respected certification scheme.

Discussion Points
- Harvesting challenges.
- Matching the right machinery to the conditions.
- Difficulties small wood lots have with species mix, marketing and costs (e.g. Forest Practices Plans, machinery movement, supervision etc.).
- Why we do harvest small woodlots?

AKS Forest Solutions Pty Ltd
Optimising Outcomes for Private Forest Owners
We are a Forest Management Company providing complete solutions from the forest to the market.

Tony Stonjek is a second generation Tasmanian forest manager. His experience covers working life across all aspects of forestry and forests: plantations and natural forest, from establishment, forest management, harvesting and markets.

Tony Stonjek
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Fax: 03 6340 1592
Mobile: 0419 573 205
Email: astonjek@bigpond.net.au
Growing Cypress for Timber

Henry Chan, Private Forest Advisor, Private Forests Tasmania

Cypress is a tough customer. Once established it grows on a diverse range of sites, even in drier climates. Unmanaged trees have been milled for general use timbers and often garden furniture. When managed, cypress timber comes into a class of its own and is superior to Radiata Pine. Cypress timber is versatile and can command a substantial price. It is held in high regard in New Zealand and is increasingly recognised as a speciality timber in Australia.

The cypresses belong to the two closely related genera *Cupressus* and *Chamaecyparis* (False Cypress) in the *Cupressaceae* family (other genera are *Cryptomeria, Cunninghamia, Sequoia* and *Thuja*).

The better known cypresses in both Australia and New Zealand have very similar wood properties and timber uses, and are marketed under the trade name “macrocarpa”

1. Monterey Cypress (*Cupressus macrocarpa*) was originally established as shelterbelts and is often called Macrocarpa.
2. Mexican Cypress (*Cupressus lusitanica*) is more resistant to canker and has better sawmilling qualities.
3. Leyland Cypress (*Cupressocyparis leylandii*) is a hybrid cross, i.e. *Cupressus macrocarpa* X Alaskan Cedar (*Chamaecyparis nootkatensis*).
4. Lawson Cypress (*Chamaecyparis lawsoniana*).

Site Suitability
Cypress grows well on sites with; 600-1000 millimetres per year rainfall, sheltered lower slopes and fertile, slightly sandy, clay loam soils. Cypress has a high frost tolerance.

Cypress Canker
Cypress Canker is generally now widespread. It is fungal disease caused by several species of the *Seiridium* group (mainly *S. cardinal*, *S. unicorne* and *S. cupressi*). Spores are spread by wind, water droplets, insects, birds and pruning tools and, when conditions are moist and warm, they land on bark cracks and wounds in trees. The disease can also be spread by infected seedlings and cuttings. The fungus toxin stops the movement of sap in the conductive tissue below the bark.

Physical symptoms include browning of branch and stem crowns, resin bleeding and bark discoloration. Often progressive dying of branches over many years can be seen in both young and old trees. Mortality can occur in young stands. There is evidence that trees become more resistant as they grow older. Canker is often more prevalent when trees are stressed by drought.

Macrocarpa is more susceptible to the disease than Lawson and Leyland cypresses. The Mexican cypress has better resistance; hence is recommended for new plantings. Many new improved breeds of cultivars and hybrids with more canker resistance are now being produced in New Zealand by crossing both *C. macrocarpa* and *C. lusitanica* with other immune or
resistant species, such as Guadalupe cypress (*Cypresus guadalupensis*), Alaskan cypress (*Chamaecyparis nootkatensis*). Another new cross under development is the Italian cypress (*Cupressus semprevirens*) of which one immune clone has a bacterium on the foliage that produces a toxin that inhibits the germination of canker spores.

Adam Culley’s cypress is a mix of two New Zealand clones, Kukupa and Strathallan. At planting, it was thought these two clones more canker resistant than earlier macrocarpa plants. Adam sensibly and progressively removed the infected trees and now the remaining trees are healthy with little canker.

To minimise the risk of canker:
- Select resistant species/hybrids for new planting, such as *C. lusitanica* and *C. ovensii*.
- Avoid planting new sites close to old shelterbelts or woodlots that may be infected;
- Select planting sites on cooler south facing slopes.
- Prune in colder months.
- Remove and burn infected branches and trees.
A Typical Cypress Regime

1. Plant 1,000 trees per hectare.
2. Form prune about age 2-3 years (remove one double leader and large branches).
3. Clearwood prune in 3-4 lifts (about ages 6, 8, 10, 12 years) to a height of 6 metres.
4. Waste thin after the final pruning lift to leave 250 to 300 pruned trees per hectare.
5. Clearfall at 35-40 years.

Wood Products

On a good site; a 35 year old, well-managed tree, 28 metres tall can produce about 2 cubic metres of wood. About 25% is clearwood (in the pruned log), 60% is sawlog, and 15% is residue as can be seen in the diagram below.
(Source New Zealand Ministry of Forestry).
Estimated Stand Growth

*C. macrocarpa* is capable of very good diameter growth especially at low stockings. Scion Research, New Zealand, used a special growth model to model plantation growth of an existing 13 year old, high pruned plantation on a productive site. (Adam’s site in comparison is moderately productive). They thinned the stand to 178 sph at 14 years and estimated the stand characteristics at 40 years as shown in the table.

<table>
<thead>
<tr>
<th>Stand Characteristics</th>
<th>Age</th>
<th>Diameter at Breast Height</th>
<th>Stems Per Hectare</th>
<th>Mean Tree Height</th>
<th>Basal Area</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>years</td>
<td>centimetres</td>
<td>number</td>
<td>metres</td>
<td>m²/ha</td>
<td>m³/ha</td>
</tr>
<tr>
<td>2013 measurement</td>
<td>12</td>
<td>15.4</td>
<td>582</td>
<td>10.9</td>
<td>10.7</td>
<td>41</td>
</tr>
<tr>
<td>Harvest at 40 years</td>
<td>40</td>
<td>59.8</td>
<td>178</td>
<td>28.4</td>
<td>50.1</td>
<td>501</td>
</tr>
</tbody>
</table>

**Measures of tree performance – Adam Culley’s Cypress plantation**

- **Year planted**: 2001
- **Planting stocking**: 1200
- **Non-commercially thinned and high pruned.**
- **Current stocking**: 580 sph
- **Average tree diameter (DBHOB)**: 10.5 cm
- **Average tree height**: 10.5 m
- **Basal Area**: 11.7 m²/ha
- **Volume**: 41 m³/ha
- **Growth - Mean Annual Increment**: 3.5 m³/ha
Macrocarpa clone, Kukupa, planted in 1995 and pruned to 6 metres (New Zealand)

Adam Culley’s Kukupa (and Strathallan) planted in 2001 and pruned to 6 metres
Wood Properties

Durability

- Cypress heartwood is one of the most durable exotic softwoods.
- Heartwood can last for 20-30 years outdoors and even up to 40-60 years if protected from sun/rain.
- Natural resistance to fungal rot and insect attack (borer and termite).
- Well suited for school playgrounds, public parks, private landscaping (where no chemical treatment or toxicity is required).
- High structural strength.

Ease of Work

- Fine grain, even texture with a natural sheen/lustre.
- Machines, turns and sands well – high quality finishes.
- Can be painted, oiled and stained.

Uses of Cypress Timber

Interior Uses

- house framing
- flooring
- wall panelling
- furniture
- exposed beams
- doors & jambs
- window liners
- skirtings
- architraves
- ceiling sarking
- roof shingles
- trusses
- bench/table tops
- wood turning
- crafts
- joinery

Exterior Uses

- boat building
- weatherboard
- decking
- paving
- outdoor furniture
- house surfeit
- pergolas
- garden beds
**Log and Timber Prices**

The following prices were sourced by Private Forests Tasmania. The Victorian and New Zealand prices are provided for comparative purposes. Prices from Tasmania and Victoria are current at 2011 and prices from New Zealand are current at 2007.

<table>
<thead>
<tr>
<th>Log Product (farm gate)</th>
<th>Tasmania</th>
<th>Victoria</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/tonne</td>
<td>$/tonne</td>
<td>$/tonne</td>
</tr>
<tr>
<td>Pruned Log</td>
<td>150</td>
<td>150-180</td>
<td>140-225</td>
</tr>
<tr>
<td>Pruned Log (top quality)</td>
<td></td>
<td></td>
<td>300-400</td>
</tr>
<tr>
<td>Sawlog (green knots)</td>
<td>70</td>
<td>80-100</td>
<td>80-100</td>
</tr>
<tr>
<td>Sawlog (lower quality)</td>
<td>30-60</td>
<td>60-80</td>
<td>40-50</td>
</tr>
<tr>
<td>Firewood Log</td>
<td>10-20</td>
<td>20-30</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timber Product (retail)</th>
<th>Tasmania</th>
<th>Victoria</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/m³</td>
<td>$/m³</td>
<td>$/m³</td>
</tr>
<tr>
<td>Air dried sawn clear heartwood</td>
<td>1,500-4,000</td>
<td></td>
<td>1,700-2,500</td>
</tr>
<tr>
<td>Green sawn clear heartwood</td>
<td>800-1,200</td>
<td>500-1,000</td>
<td>800-1,000</td>
</tr>
<tr>
<td>Air dried appearance &amp; structural</td>
<td>Up to $2,000</td>
<td></td>
<td>1,000</td>
</tr>
<tr>
<td>Green sawn appearance &amp; structural</td>
<td></td>
<td></td>
<td>400-600</td>
</tr>
<tr>
<td>Lower grade outdoor sawn timber</td>
<td></td>
<td></td>
<td>250-350</td>
</tr>
<tr>
<td>Landscape, outdoor, sleepers</td>
<td></td>
<td></td>
<td>400</td>
</tr>
</tbody>
</table>

Macrocarpa landscape 200x100mm sleepers
300x200mm band sawn cypress beams

Macrocarpa tongue and groove panels
Macrocarpa tongue and groove flooring

Quality outdoor cypress furniture
A distinctive *Cypress macrocarpa* dresser

A *Cypress macrocarpa* entertainment unit (Federation)–As good if not better than Blackwood?
Tree Shelter in Farm Forestry

Greg Unwin

(information given as a powerpoint handout)
My Story - Ed Archer

I’d like to give you an insight into tree planting on ‘Greenhythe’. I will explain what we have done and why, as well as my future expectations. While I don’t know all the answers about growing trees, we a have learnt a lot along the way and will learn a lot more in future. I’m pleased to share my experiences with you.

Why we planted trees........
The first lot of trees are a result of Dads work. He decided to plant *Eucalyptus globulus* in about 1998 because:

- Some areas of land weren’t suited to grazing management and other areas were quite rocky.
- Our Angus seed stock management requires we do a lot of single sire mating and have one bull with 50 cows. We need to keep them separate and a shelterbelt puts some distance between mobs.
- We did not have much stock shelter. In the winter we get a cold north westerly wind and if we get rain with it, the stock really suffer. We were getting grass tetany issues with the stock and they got so cold that the wind would blow them into the south east corner of the paddock and they would stand there all day and not eat. They were getting a metabolic imbalance and we were losing cows. Management and nutrition are other factors in addition to shelter. But we realised we needed good shelter quickly.

Getting the shelterbelts planted........
The cost to establish the shelterbelts was minimal because we used a forestry joint venture option. We supplied the land and the fencing and maintained it. Our JV contracts are a little different. We did the mound ploughing for the first one and Gunns did all of that for the second one. The income from the trees at harvest was not the focus. We were focused on stock and property management and any money we get when the trees are harvested is a bonus. This gives us some extra capital to do something else and to replant ourselves if we do not have a joint venture partner next time round. This option gave us shelter quickly. We had good shelter within a couple of years.

Some benefits........
Live weight gain comes down to getting young heifers to joining weight. The less energy they burn keeping themselves warm in the winter months means more weight gain. We have a target weight our heifers need to be to be by 1 September for joining in October. We join them at 12 to 13 months of age so as to calf before 2 years old. We are pushing them quite well and if we offer them some shelter to keep warm they are not burning energy to maintain their body and they can actually put on weight. This another positive benefit from the trees particularly on the north facing slopes where it can get particularly cold in the winter.

We calculated that with shelter, we will make a 20 kilogram per head gain for the season. There was no scientific testing or accurate testing done but when you spend all your life with livestock you can soon tell if they are happy or not. If they have decent shelter they can keep warm and together with feed they keep putting on weight. Also at this time of year we get
over 30 degree days and a black cow gets pretty hot. You will see them sit alongside the trees for shade and the few paddock trees we have left. There are some paddocks that now have no trees, so a bit of shade on hot days makes a big difference.

My main business is stock and I have just started to keep numbers of stock kept on individual paddocks. Our winter stocking is around 22 DSE per ha compare to the district average of around 12 DSE. The trees are not costing us in production.

**Grazing value within and adjacent to shelterbelts**

We have found fenced off areas with trees provide feed in the depths of winter or in a drought. We don’t mind that area under the shelterbelts is grazed out 4 times a year. When pinched for feed, or particularly when it is cold, we can put 100 cows in there for a week. They are happy and warm and can eat the tucker underneath the trees.

We do notice a 15m strip along the outside of the shelterbelts where the pasture dries off faster in summer and early autumn, indicating water use by the trees. Stock also spend a lot of time here eating this pasture first and with more foot traffic knock the pasture round more. So there is bit of a double whammy.

**Our designs maximise benefits**

We started planting *Eucalyptus globulus* in 1998 on the 500 acre block because the land is more arable land with fewer rocks and with few native trees. We decided where trees were needed for shelter and laid out shelterbelt design on the land that was not good for grazing. The shelterbelts are about 12 rows of trees in width.

In 2005 we planted the East Arm block and ran 60 m wide *E. nitens* shelterbelts north south to stop the westerly winds. Here we had to give up grazing land. It could have been left as a paddock but we felt the land that we were giving up for trees would be more than made up for in the rest of the paddock and in keeping the stock warm or cool. Overall there would be no net loss but a net gain.

The blocks on the north facing bank were designed to provide shelter extending about 12 tree heights into the paddock and about one third of each paddock has protection from the trees. You could really spend some time on this and measure pasture production but I can visually see the benefit.

My neighbours have only made positive comments on our tree planting. It’s a very prominent landscape and the Council was concerned about straight lines in the landscape and particularly shelterbelt rows down a certain hill which would not look good. We got a DA to make sure there were no issues. Without the shelterbelts, we would have had a denuded hill on which all the native trees are dead. The shelterbelts look structured and may not be ideal, but it’s better than having no trees.

The choice of species, *Eucalyptus globulus* or *E. nitens*, was made by Gunns. By the time of the second JV, I understand Gunns had decided to grow *E. nitens* because they had better growth rates at the time and even though *E. globulus* was of better quality, it did not grow as fast.
Hence the first JV was *E. globulus* and the second JV was *E. nitens*. We ended up with a lot more *E. nitens*. I did not have a lot of experience with this species and now looking back I would have said, ‘No let’s investigate growing trees with someone who will grow *E. globulus*’. That’s another life lesson – you live and learn.

So far *E. nitens* are doing their job providing shelter – that’s no problem. But, if we want to do something else with the land before the JV is due to wind up we can’t because the company owns the trees and will harvest the trees when they want.

I have another 65 hectares of woodlots on land separate from the main farm - 20 hectares of *E. globulus* and 45 hectares of *E. nitens*. This land was inundated with wildlife and had security issues with stock so we planted it out to trees. Now I visit this block once a year.

*Harvesting trees....*

The 1998 *E. globulus* are due for harvesting shortly. This is not ideal because we planted them all at the same time, because we needed a lot of shelter quickly, and now we will lose a lot of shelter at harvesting. We expect to have useful shelter back within a few years after harvesting. Aesthetically, there will be a big impact and the land holders at Rowella who will see a big difference for a period of time. Staggered plantings may have been a better option so only some shelter is lost at any time and the landscape impact is reduced.

When the trees were planted, Private Timber Reserve was put in place to ensure the trees could be harvested.

Another option may have been to have negotiated with the JV partner in the beginning to stagger the harvesting over a number of years. Many shelterbelts are not wide enough to harvest half in one year and the rest in about two years. It’s not cost effective. In the bigger areas it would be possible to take some and come back in two years and take the rest.

*Regrowing the trees .......

I will be looking for advice on how best to re-establish the trees after harvest. My number one option would be to manage the coppice and not replant. I have had different advice and have mixed feelings about how successful this will be. An ex-Forestry Tasmania forester suggested that stumps could be pulled out and trees replanted. This is expensive and my focus is on shelter. I think the most cost effective option will be to let the coppice grow.

I know that coppice will initially grow quicker than planted trees and that each stump may have 3 - 4 coppice stems. About 1,000 trees per hectare were planted originally and they have sorted themselves out to about half that now. Even relying on coppice I may need to do some replanting to fully stock the shelterbelt to provide good shelter. I don’t want too much wind blowing thought the shelterbelts.

When I was investigating timber prices, one company suggested they may be interested in managing the coppice. So there are options there. We don’t have a lot of expertise in coppice management and we don’t have the time to be knocking coppice shoots off so we will have to look further at this.
**Biodiversity…..**
Some of the mixed species plantings have done really well. The plantations provide biodiversity values for birds and animals. We get some wallabies in plantations that are out on their own but nothing like when land borders forest blocks.

**Property Value…..**
The trees have increased my property value. Something’s I think a real estate valuer should take into consideration are:
- I have really good shelter for stock and my stock enterprise is more profitable.
- The trees are quite picturesque and the farm is a more pleasant place to work.
- The trees have a harvest value. At the height of the pulp wood market when the trees were worth $30 per tonne at the farm gate. This was not a bad return per hectare compared to a commercial cattle enterprise – the trees would not be far behind. Recently Private Forests Tasmania estimated there are about 400 tonnes of wood per hectare in the *E. globulus* shelterbelt.

**The Future…..**
In next rotation we will look at having shelter there for a longer time. The way the market is at the moment we will look at growing bigger trees for timber that can be sawn. We need to be mindful that the bigger the trees are, the less vegetation lower down will see more movement of wind through the shelterbelt. We could grow a complementary species such as Blackwood in the outside rows for low shelter. At the moment the blackberries are doing a pretty good job as los shelter.

We definitely have more areas we will look to plant in next few years. We have been leasing extra land and our work load has been pretty high, so we haven’t done a lot. I have some NRM funding to fence out and plant a 40m wide drain where we have had some washing caused by cows which we want to exclude. We’ll get some natives in there.

We have had help from Greening Australia and NRM North to fence off and revegetate our river frontage and the block we have bought was largely revegetated by Mr Wish-Wilson. There is about 300m left to do and I will finish this off with NRM assistance. The native melaleuca has just regenerated really well and this is important shelter for us. Quite a few wallabies live there but not to a point where they are a problem.

We try to keep a few of the old native trees but they are hard to fence off. We have another project to do next financial year to fence off younger native trees. We have fenced 0f 30ha of native forest at the Rocks Craigburn Road but the trees are not regenerating they are still dying back and even the wattles are dying back. The fertiliser, the stock and the possums are beating them unfortunately and this is a pity.

Where my house is all the forests are fenced off from stock and the forest is still healthy. It’s hard to keep the fertiliser off when the fertiliser truck throws the fertiliser 30m. It makes sense to manage the trees in blocks. Trees aren’t meant to be isolated. When the land was cleared everything was knocked over. With hindsight blocks of trees, particularly on rocky
ground, could have been left when the land was originally cleared and, if so, we would benefit today.

**Summing up.....**

We are always learning and looking to improve what we do. We are convinced that the shelterbelts have been successful. They have proved their worth many times over. I would like even more. I’m sure the harvesting and regrowing of trees will be challenging but this is now just another part of our business.
Eucalypt Shelterbelts

Property of Ed Archer
David Bower, Private Forest Advisor, Private Forests Tasmania

On ‘Greenhythe’ shelterbelts and woodlots dominate the landscape and are an important element of the farming enterprise.

Why?
- To provide shelter, in order to improve livestock gains and reduce winter feed inputs.
- To improve the aesthetics of the farm landscape.
- To replace older paddock trees as they approach the end of their lives.
- The current crop will be sold as pulpwood. The next crop will be grown for solid wood products.

What?
- Native species were preferred.
- Plantation design is centred on shelterbelts and small woodlots.

Where?
- In exposed areas.
- Strategically spaced to maximize shelter for livestock and pasture production.
- Trees were established on less productive soils and areas of the farm which were difficult to manage.

How?
- Share farming arrangement (JV) with a then major timber company to share the input costs and later share the returns at harvest. (Typically, landowners provided the land and fenced it to exclude livestock. With long belts, fencing is a considerable proportion of establishment costs).
  
  On ‘Greenhythe’ 20ha of *Eucalyptus globulus* and 60ha of *Eucalyptus nitens* were established under joint venture. *Eucalyptus globulus* were established in 1998 and *Eucalyptus nitens* in 2005. About 2000 a corporate decision was made by the timber company to grow *Eucalyptus nitens* exclusively. Hence, there was the change in plantation species from one JV to the other. The JV partner has scheduled *E. globulus* for harvesting in 2015, with no prospect of another JV to facilitate growing, managing and harvesting of the next tree crop.

The farm plan involves expanding the areas sheltered (more shelterbelts) and managing harvesting to minimize the loss of shelter immediately after harvest. It may also require the strategic shifting areas designated for calving and lambing, winter grazing and grazing of sheep off shears.
Table 1: Ed Archer’s Shelterbelts - Stand Statistics (Current and Future Estimates)

Note: Figures below are indicative only and best used to make general comparisons. They are specific to site. They should not be relied upon for their absolute values. Seek professional advice.

<table>
<thead>
<tr>
<th>Plantation Species</th>
<th>Year Planted</th>
<th>Age (years)</th>
<th>Initial stocking (Stems/ha or sph)</th>
<th>Current Stocking (Stems/ha or sph)</th>
<th>Diameter DBHOB av (cm)</th>
<th>Height MDH (m)</th>
<th>Basal Area BA (m²/ha)</th>
<th>Standing Volume (m³/ha)</th>
<th>Growth MAI (m³/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Eucalyptus globulus</em> (Current)</td>
<td>1998</td>
<td>15</td>
<td>1020</td>
<td>550</td>
<td>28.7</td>
<td>26</td>
<td>48.0</td>
<td>416</td>
<td>28</td>
</tr>
<tr>
<td><em>Eucalyptus nitens</em> (Current)</td>
<td>2005</td>
<td>8</td>
<td>1050</td>
<td>763</td>
<td>15.0</td>
<td>13</td>
<td>18.7</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td><em>Eucalyptus nitens</em> (modelled forward)</td>
<td>Modelled to age 15</td>
<td>15</td>
<td>1000</td>
<td>957</td>
<td>19.0</td>
<td>21</td>
<td>29.5</td>
<td>209</td>
<td>14</td>
</tr>
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</table>

Note: The growth model (Farm Forestry Toolbox V5.2.11) underestimates mortality, i.e. self-thinning due to competition within the *E. nitens* stand and thus estimates may be a little optimistic.

Note: Private Forests Tasmania measured at opposite ends of the productivity spectrum. The *E. nitens* plot was on a dry rocky bank, while the *E. globulus* plot was on an east-facing slightly sheltered mid slope. Therefore, it is not possible directly compare species performance.
**Table 2: Ed Archer’s Shelterbelts – Economics** (Farm Forestry Toolbox V 5.2.11)

Note: Figures below are indicative only and best used to make general comparisons. They are specific to site. They should not be relied upon for their absolute values. Seek professional advice.

<table>
<thead>
<tr>
<th>Plantation Species</th>
<th>Regime</th>
<th>Thinning</th>
<th>Rotation (years)</th>
<th>Costs ($ 2014)</th>
<th>Returns ($ 2014)</th>
<th>IRR (%)</th>
<th>NPV ($/ha)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Eucalyptus globulus</em></td>
<td>Pulpwood</td>
<td>Nil</td>
<td>15</td>
<td>$1250</td>
<td>$2700</td>
<td>6.2%</td>
<td>$120</td>
<td>Pulp:$10 per tonne (Volume is conservative by 10%-20%)</td>
</tr>
<tr>
<td><em>Eucalyptus globulus</em></td>
<td>Pulpwood</td>
<td>Nil</td>
<td>15</td>
<td>$1250</td>
<td>$6700</td>
<td>13.1%</td>
<td>$2000</td>
<td>Pulp:$25 per tonne (Volume is conservative by 10%-20%)</td>
</tr>
<tr>
<td><em>Eucalyptus nitens</em></td>
<td>Pulpwood</td>
<td>Nil</td>
<td>15</td>
<td>$1250</td>
<td>$1900</td>
<td>3.6%</td>
<td>-$177</td>
<td>Pulp:$10 per tonne</td>
</tr>
<tr>
<td><em>Eucalyptus nitens</em></td>
<td>Pulpwood</td>
<td>Nil</td>
<td>15</td>
<td>$1250</td>
<td>$4700</td>
<td>10.4%</td>
<td>$1100</td>
<td>Pulp:$25 per tonne</td>
</tr>
</tbody>
</table>

Note: The growth model (Farm Forestry Toolbox V5.2.11) underestimates mortality, i.e. self-thinning due to competition within the *E. nitens* stand and thus estimates may be a little optimistic.

Note: Private Forests Tasmania measured at opposite ends of the productivity spectrum. The *E. nitens* plot was on a dry rocky bank, while the *E. globulus* plot was on an east-facing slightly sheltered mid slope. Therefore, it is not possible directly compare species performance.
Reforestation
Implications of a Private Timber Reserve

The commercial shelterbelts on ‘Greenhythe’ are a declared Private Timber Reserve (PTR). This primarily ensures the investment can be realised in the event of changes to the local planning scheme. One of the requirements of a PTR is that the land must remain forested. Therefore, after harvesting, the land must be reforested, unless the PTR is formally revoked.

Coppice

- **Coppice refers to shoots which sprout as regrowth** from dormant buds under the bark of trees/ stumps. This ecological adaption enables trees to survive fire.
- The ability to coppice is **dependent on the species, the age of the tree, and sometimes on the environmental conditions and season of the felling of the parent tree**.
- Unlike *E. nitens*, *E. globulus* produces prolific coppice which potentially allows the plantation to regenerate itself after harvest.
- Coppicing ability declines with age and coppice on larger stumps tends to be not so straight and break off more easily.
- Coppice regeneration is more difficult to manage in older sawlog plantations than in fast growing short rotation pulpwood regimes.
- Sawlog plantations are usually thinned and coppice from the stumps of thinned trees is suppressed by the retained stand. There will be gaps in the coppice stimulated by clear fall, i.e. the site is unlikely to be fully stocked if coppice alone is the method of regeneration.
- **A combination of coppice management and supplementary planting may be required to achieve full stocking of the next rotation.**
- Some spot cultivation and weed control may be required immediately after clearfall harvest for supplementary planting.
Maintaining shelter in a wood production system - A strategic approach

Belts of trees can be designed for shelter, timber, or for both shelter and timber. Managing belts of trees for multiple benefits may be most attractive for both agricultural and forestry objectives, but are more difficult to manage than single purpose belts.

- **Shelterbelts for shelter only.**
  Eucalypt species invariably tend to lose lower branches with age, and usually will not provide continuous ‘crown to ground’ shelter.
  Supplementary (understorey) species such as, Acacia (e.g. blackwood), Banksia, Leptospermum, Melaleuca, or Allocasuarina etc. may be inter-planted in shelterbelt designs to achieve uniform shelter over the life of the belt.

- **Shelterbelts for both shelter and timber production.**
  Where broader belts are planned with timber production as an objective, it is suggested that non-commercial species be planted on the windward side.
  There are three compelling reasons for this:
  1. Silvicultural operations such as thinning would not impact on the understorey species.
  2. At clearfall, the understorey species could remain in place and provide some residual shelter until the next rotation becomes established.
  3. Site preparation for the next rotation will not impact upon retained trees or shrubs.

It is known that well-functioning shelterbelts may reduce wind speed for some 20 tree heights (20H) on the lee side. For a 20m high belt this suggests that the maximum spacing between belts would be about 400m.
If, for example, shelterbelts were spaced at 10 tree heights (10H) or 200m intervals:
- Harvesting could be scheduled so as to harvest a maximum of 50% of the belts at any one time.
- Residual shelter could be further enhanced if this strategy incorporated the supplementary species approach as outlined above.

Some shelterbelt designs and spacing (20H) (Design Principles in Farm Forestry, Rural Industries & Research Development Corporation, 1997)
Shelter at the district level

‘Shelter felt in a particular paddock results not just from the shelterbelt on that paddock, but also from any other trees on your farm or your neighbours. Converting as little as 2% of a landscape into shelterbelts (20m tall and 25H apart) could achieve a broad scale reduction in wind speed of 30%’, Design Principles in Farm Forestry, Rural Industries & Research Development Corporation, 1997).

Establishing shelterbelt systems at a landscape level is well worth consideration to create:

- Greater efficiency in wind speed reduction.
- Greater scale for timber management and production.
- Local wood pools to attract buyers and create efficiencies in fixed costs.

The one tree plain...........
Equipment for Hire
Private Forests Tasmania

The following equipment is designed to prepare tree planting sites to a high standard for successful tree planting.
All plant is transported on self-contained trailers.
A minimum 80 horse power tractor is required to pull the plough.
Advice and hire rates are available from Private Forests Tasmania.

For enquiries, please contact your nearest Private Forest Advisor:

<table>
<thead>
<tr>
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