Nomination
Australian Forest Growers
TREE FARMER OF THE YEAR AWARD - TASMANIA
2016

A vista of the Poltock property - integrated farm forestry at its best using species, designs and careful management to meet the family’s agricultural, forestry and life-style objectives.

Roger and Outhay Poltock - Wilmot
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Summary

The personal efforts by my family and I have resulted in:

- Purchase of land and management of native forests and establishment and active management of new plantations over 25 years to create a sustainable forest estate.
- Development of a viable and self-funding forest enterprise to produce additional income for my family and potentially my children and their families.
- A forest estate which contributes to environmental, economic and social outcomes for our family and the community.
- Well planned and integrated establishment, management and harvesting operations to protect special values including soils, water, native plants and animals and especially the landscape to levels prescribed in the Tasmanian Forest Practices Code.
- Our family, friends and other farmers learning about and practicing private forestry as well as enjoying it.
- Quietly educating other landowners in farm forestry to help them to make better investment and management decisions.

We believe we have:

- Achieved excellence in private forestry through ‘hands on’ experience over a long time.
- Increased the extent of forest cover and improved the management of the land (and our agricultural enterprise) according to our plans.
- Seen the involvement of the whole family in farm forestry/agroforestry.
- Demonstrated forest practices now widely acceptable to the community.
- Demonstrated principles that are suitable for adoption by other private forest growers.
- Integrated our forest activities into both our farm and our way of life.

Our Story

About 40 years ago as a young hippy / alternative life styler with several friends I purchased a 100ha property in the remote back blocks of NW Tasmania. We tried to establish a small eucalypt plantation and fruit orchard. The orchard was a success but the plantation was consumed by wildlife and the poisoning program killed our cow. Some lessons learnt, the property sold for a significant profit and my farming agroforestry career started at Wilmot, NW Tasmania, in 1982 with the purchase of a 32ha property, the home block where we now live.

I ran ewes and lambs for several years and one cold, wet, windy spring morning in the early stages
of lambing I had more dead than live lambs on the ground. At that point I resolved to start planting trees for shelter. At the same time, Ross Henderson, winner of the Tree Farmer Award in 1988, held a field day with his *Pinus radiata* agroforests. This concept got me over the line and I applied for a $6,500 loan through Private Forests Tasmania (PFT) in 1987 to help establish 10ha of pine. This plantation and shelterbelts were harvested in 2011 and 2013 with a net return of about $20,000/ha – quite a successful venture.

But this is only part of my life. I graduated from the University of Tasmania as a mature age student with a BSc majoring in geology in 1975 and Master of Economic Geology in 1994 and have worked as a mineral exploration geologist on a contract - consulting basis, mainly in Tasmania up until 1994, then in China, SE Asia, the Pacific Islands and South America.

These two commodity based businesses are characterized by cyclical boom and busts so it was always necessary to be conservative economically to survive and have an alternative occupation and income to fall back on. In some instances the cycles are coincident and occasionally, but not always, the outcome is the same, at times cash rich – time poor or cash poor. Time rich which fits well with labour intensive plantations and whole farm development. I have always been lucky to have had a neighbour to manage the property in my frequent absences. When I am home I become a tree and beef farmer.

Exploration geology is good fun and exciting especially in under developed countries but doesn’t fit well with family life and my first family came to an end when my partner and children became independent and left home. However, the children always knew where the pocket money was – pruning pine trees.

In 2005 when in Laos I met Outhay, she was the administration officer in the mining company that I was contracted to at the time. We were married in 2006 and have two children, Thomas 9 and Natalie 7. Outhay became an Australian citizen in 2015 and she has re-educated herself as a cook and is now specializing in pastry cooking. Since 2013, the beginning of the current mineral commodity downturn, I have become the house husband, farmer and forester, how things change!

Now after 30 years our property comprises 170ha of which 50ha is plantation / forest and 120ha for grazing about 200 beef cattle.

The farm plan has been to maximize returns from different qualities of land in a sustainable and safe manner.

Government loans and small grants have been used to establish the 10ha agroforest and an environmental services and NRM grant to protect some riparian zones from livestock. However, most of the blackwood plantings have been self-funded. We have funded and or invested substantial time and resources in the establishment, pruning and thinning of our forest stands including considerable fencing costs to ‘game proof’ plantation areas.
Property Details

Location

- Located at 41° south in NW Tasmania, just south of the small township of Wilmot midway between Devonport and Cradle Mountain in a farming district with dairy, beef, potatoes and plantation forestry (Attachment 1 – Locality Map).
- Undulating 350 – 460m ASL with mainly northerly aspect.
- Original forest cover was mixed Eucalyptus viminalis, E. obliqua and E. regnans, Acacia melanoxylon (blackwood) with rainforest species in gullies and shaded valleys.

Geology & Soil

- Tertiary basalt with Ordovician quartzite ridges on the eastern edge of property.
- Red stony basaltic soil with less fertile sandy soils developed on quartzites.

Climate

- **Rainfall, Snow and frost**
  Average annual rainfall is 1,000 – 1,500mm, mainly falling in the winter and associated with west – north west winds but occasionally heavy summer falls associated with low pressure systems tracking down the eastern mainland coast. Wilmot is at the north east edge of the west coasts high rainfall zone. Snow frequently falls in August – September but rarely settling for more than 24 hours. Frosts are common but being on north facing slopes are less severe than in low lying areas.

- **Temperatures**
  Mean maximum monthly temperatures vary from 22 degrees (January) to 12 degrees (July). Mean minimum monthly temperatures vary from 4 degrees (July) to 10 degrees (January). Mid – late summer temperatures can be in the 30’s and if associated with hot northerly winds and electrical storms represent an extreme bush fire risk.

- **Wind**
  Prevailing winds are from SW - NW and sweep across the higher parts of the property. These can be bitterly cold especially the SW from snow covered Black Bluff (1,300m ASL) and 15km line of sight away.

Farm production – Agriculture

- Grazing beef cattle with calves purchased in autumn and sold as fats direct to meat works 12 – 20 months later, with capacity 200 head, harvesting adequate hay and silage on farm.
- In the early stages of pine plantations old wethers were kept during the summer to reduce fire hazard, however in the last few years, wallabies more than adequately fill this role.
- Irrigation for beef fattening will commence this summer, there are two 15 mega litre dams on the farm.
Farm production – Forestry to date

- Clear-felling degraded / cut over native forest on properties when purchased, 7ha (201 Cradle Mountain Road) and 3ha (Egmont), for veneer, sawlog, chip and firewood. These blocks have been replanted with pine.
- Spot milling of large native forest edge trees prior to radiata pine (Pinus radiata) planting at 265 Cradle Mountain Road (Photo 1) produced timber, mainly sleeper sized, for garden walls and construction framing for barns on our farm.
- Harvesting of 10ha of radiata pine (wide spaced agroforestry), small pine woodlots and pine windbreaks on 192 Cradle Mountain Road, all replanted to pine except for 3ha’s converted to pasture.

Table 1. Harvest Volumes and Income from 9ha Agroforestry and Pine Shelterbelts - 192 Cradle Mountain Road

<table>
<thead>
<tr>
<th>Log Quality/Grade</th>
<th>Tonnage</th>
<th>Percentage</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pruned</td>
<td>1605.80</td>
<td>37%</td>
<td>$115,617</td>
</tr>
<tr>
<td>Mixed</td>
<td>1526.50</td>
<td>35%</td>
<td>$39,689</td>
</tr>
<tr>
<td>Export</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A grade</td>
<td>266.96</td>
<td>6%</td>
<td>$4,368</td>
</tr>
<tr>
<td>K grade</td>
<td>205.80</td>
<td>5%</td>
<td>$1,396</td>
</tr>
<tr>
<td>KI Grade</td>
<td>400.16</td>
<td>9%</td>
<td>$1,362</td>
</tr>
<tr>
<td>P 18 Grade</td>
<td>274.30</td>
<td>6%</td>
<td>0</td>
</tr>
<tr>
<td>P12 Grade</td>
<td>46.24</td>
<td>1%</td>
<td>0</td>
</tr>
<tr>
<td>Rejects</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Farm production – Forestry future

2020 – 2025 plantations on 192, 201 and 265 Cradle Mountain Road will be harvested for veneer logs, sawlogs and pulp logs) from:

- Pruned radiata pine and Leyland Cypress (Cupressocyparis leylandii) plantations and radiata pine shelterbelts.
- Replanted harvested radiata pine plantations.

Farm production - Agriculture and Forestry Synergy

As far as possible I have tried to integrate forestry and agriculture through:

- Integrated radiata pine shelterbelts to increase pasture and beef production.
- Integrated biodiversity riparian plantations for wildlife habitat, improved pasture production, water quality and reduced erosion.

While the property holding is relatively small, I have endeavored to maximise its production both from year to year and in the long term.
On the down side, there is a need to maintain shelterbelts with regular pruning and trimming. They provide habitat for pademelon wallabies which are a major problem for pasture and tree production and bark stripping of 4-5 year old pines is not uncommon.

**Tree growing aspects**

The main aim has been to maximise land use; establishing trees on steep, incised and difficult to work areas for stock shelter and wood production as well as planting up along dams, streamsides and wet areas to improve water quality. The planting of the steep areas also negated the potential hazard of accidents with farming machinery. With exception of native forest the property was largely devoid of trees at the time of purchase. *(Attachment 2 – Property Plan Prior to Tree Planting).*

Tree plantings are in 3 categories:

- a) commercial plantations of radiata pine and Leyland Cypress;
- b) radiata pine shelterbelts. These also include pruned trees; and
- c) amenity / environmental plantings of blackwood and other natives in creek gullies and shelterbelts near the house and stockyards.

**Property History**

**Land ownership – purchases**

We have made the following purchases and these former small mixed farms now comprise the property, being 170ha on 5 titles:

- **1982** - 192 Cradle Mountain Road - 32ha
- **1995** - 265 Cradle Mountain Road - 30ha
- **1998** - 201 Cradle Mountain Road - 6ha
- **2010** - Egmont - 62ha north of, and adjoining 192 Cradle Mountain Road; the home block.

The property plan shows the above properties and the forestry/tree planting activities *(Attachment 3 – Property Plan).* Photos of these activities are referenced below and shown in *(Attachment 4 - Photos).*

**Forestry Activities**

The following table lists tree planting and harvesting actives we have conducted:
## Table 2: Forestry Activities, Funding and Income

<table>
<thead>
<tr>
<th>Year</th>
<th>Property/Number</th>
<th>Area ha/m</th>
<th>Species</th>
<th>Type</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>192</td>
<td>Shelter belt</td>
<td>Mixed native</td>
<td>Amenity</td>
<td>Self</td>
</tr>
<tr>
<td>1987 - 88</td>
<td>192</td>
<td>10.0ha</td>
<td><em>P. radiata</em></td>
<td>Agroforestry</td>
<td>PFT pine loan</td>
</tr>
<tr>
<td>1988</td>
<td>192</td>
<td>0.2ha</td>
<td><em>A. melanoxylon</em></td>
<td>Amenity creek</td>
<td>Self</td>
</tr>
<tr>
<td>1991</td>
<td>192</td>
<td>200m (0.12ha)</td>
<td><em>T. plicata, P. radiata</em></td>
<td>Shelter</td>
<td>Self</td>
</tr>
<tr>
<td>1991</td>
<td>192</td>
<td>0.1ha</td>
<td>Mixed native</td>
<td>Amenity</td>
<td>Self</td>
</tr>
<tr>
<td>1992</td>
<td>192</td>
<td>1.0ha</td>
<td><em>C. leylandii &amp; E. nitens</em></td>
<td><em>E. nitens</em> nurse crop</td>
<td>Self</td>
</tr>
<tr>
<td>1998</td>
<td>265</td>
<td>250m (0.15ha)</td>
<td><em>P. radiata</em></td>
<td>Shelterbelt 2 rows</td>
<td>Self</td>
</tr>
<tr>
<td>1999</td>
<td>265</td>
<td>1.5ha</td>
<td><em>P. radiata</em></td>
<td>Conventional</td>
<td>Self</td>
</tr>
<tr>
<td>1999</td>
<td>201</td>
<td>1.0ha</td>
<td><em>P. radiata</em></td>
<td>Conventional</td>
<td>Self</td>
</tr>
<tr>
<td>2000</td>
<td>265</td>
<td>2.4ha</td>
<td><em>P. radiata</em></td>
<td>Conventional</td>
<td>Self</td>
</tr>
<tr>
<td>2000</td>
<td>265</td>
<td>0.2ha</td>
<td><em>A. melanoxylon</em></td>
<td>Amenity</td>
<td>Self</td>
</tr>
<tr>
<td>2001</td>
<td>201</td>
<td>5.9ha</td>
<td><em>P. radiata</em></td>
<td>Conventional x native bush</td>
<td>Self</td>
</tr>
<tr>
<td>2001</td>
<td>201</td>
<td>0.5ha</td>
<td><em>A. melanoxylon</em></td>
<td>Amenity</td>
<td>Environmental Services grant</td>
</tr>
<tr>
<td>2002</td>
<td>201</td>
<td>0.3ha</td>
<td><em>A. melanoxylon</em></td>
<td>Amenity</td>
<td>Environmental Services grant</td>
</tr>
<tr>
<td>2004</td>
<td>265</td>
<td>470m (0.28ha)</td>
<td><em>P. radiata</em></td>
<td>Shelterbelt 2 rows</td>
<td>Self</td>
</tr>
<tr>
<td>2012</td>
<td>192 Egmont</td>
<td>15.0ha</td>
<td><em>P. radiata</em></td>
<td>Conventional</td>
<td>Self</td>
</tr>
<tr>
<td>2012</td>
<td>Egmont</td>
<td>400m (0.24ha)</td>
<td>Mixed native</td>
<td>Riparian</td>
<td>NRM grant</td>
</tr>
<tr>
<td>2013</td>
<td>Egmont</td>
<td>3.0ha</td>
<td><em>P. radiata</em></td>
<td>Conventional</td>
<td>Replant of 2012</td>
</tr>
<tr>
<td>2013 - 14</td>
<td>Egmont</td>
<td>700m (0.47ha)</td>
<td><em>P. radiata</em></td>
<td>Shelterbelt 2 rows</td>
<td>Self</td>
</tr>
<tr>
<td>2014</td>
<td>Egmont</td>
<td>3.0ha</td>
<td><em>P. radiata</em></td>
<td>Conventional</td>
<td>Replant of 2012</td>
</tr>
<tr>
<td>2015</td>
<td>192</td>
<td>3.0ha</td>
<td><em>P. radiata</em></td>
<td>Conventional</td>
<td>Replant part of 2014 harvest</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Property/Number</th>
<th>Area ha/m</th>
<th>Species</th>
<th>Type</th>
<th>Harvest Return $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>201</td>
<td>7.0ha</td>
<td>Native forest</td>
<td>Clear fell degraded native bush</td>
<td>$2,000</td>
</tr>
<tr>
<td>2011</td>
<td>192</td>
<td>1.0ha</td>
<td><em>P. radiata</em></td>
<td>Agroforestry</td>
<td>$20,130</td>
</tr>
<tr>
<td>2011</td>
<td>Egmont</td>
<td>3.0ha</td>
<td>Native forest</td>
<td>Adjacent to above</td>
<td>$27,750</td>
</tr>
<tr>
<td>2014</td>
<td>192</td>
<td>9.0ha</td>
<td><em>P. radiata</em></td>
<td>Agroforestry (pine loan) woodlots, shelter belts</td>
<td>$18,040</td>
</tr>
</tbody>
</table>
Some specific tree planting details

**192 Cradle Mountain Road**

1986  Amenity plantings with mixed native species near stockyards and planned house site.
1987/88 Private Forests Tasmania Pine Development Loan for establishing 10ha radiata pine
Agroforestry “alley farming” with alternate belts of 3 rows “staggered 2m x 1.5m spacing” pines and 20m grazing alleys (Photo 2). Site preparation was by contractor but planting, pruning and thinning by myself and family. This was a very innovative practice at the time.
1988  Established 0.2ha Blackwood along creek gully.
1991  Radiata pine and Western Red Cedar (*Thuja plicata*) windbreaks for the new house; plus mixture of Blackwood / Tea-tree (*Leptospernum*) / dogwood (*Pomaderris apetala*) plantings in creek gullies.
1992  Leyland cypress (1ha) was established on stony bank adjacent to creek gully (Photo 3), planted with alternate rows of Shinning Gum (*Eucalyptus nitens*) nurse crop which were ring barked and injected with Roundup in 1999. Also inter-planted a 1.0ha area of cutover native forest with Leyland cypress and Blackwood.
2014/15  Replanted in 2014/15 3ha as conventional plantation at 1,100 trees per hectare, being part of the harvested pine Agroforest (Photo 4).

**201 Cradle Mountain Road**

2000  Clear-felled 7ha cutover degraded native forest (Photo 5) and prepared for radiata pine establishment. Work included burning windrows, fencing and 1080 poisoning. These trees have now been high pruned and non-commercially thinned (Photo 6).
2001  Established 600m of radiata pine shelter windbreaks and two stands (5.6ha and 0.3ha) of conventional radiata pine plantations (Photos 7 & 8). Established a 0.5ha area with Blackwood along streamside wet land (Photo 9).
2002  Established another two plantings of Blackwood (both 0.3ha) along creek gullies and between water dams.

**265 Cradle Mountain Road**

1998  Established 250m of radiata pine shelter windbreaks.
1999  Established two stands (1.2ha and 0.3ha) of conventional radiata pine.
2000  Established a 2.4ha stand of conventional radiata pine.
2004  Established 470m of two row radiata pine shelter windbreaks; plus 2 small stands of conventional radiata pine plantations.

**Egmont**

2012  Established 15ha stand of conventional radiata pine (Photo 10), and 250m of radiata pine and native species riparian plantings (Photo 11).
2013/14  Established 700m of two row radiata pine shelterbelts.
2013/15  Replanted over 3 years, 9ha of radiata pine, ex 2012 planting.
Area of Assets

Total property area - all enterprises 170ha and includes 53ha of farm forest (31% of the property) and consists of:

- 9.8ha of 15 year old radiata pine.
- 20ha radiata pine established since 2012.
- 1,250m of double row pine shelterbelts mainly established in 2000, the two older belts on the original home block were harvested in 2014.
- 0.7ha Cupressus leylandii.
- 17ha of old forest on steep slopes of Lake Barrington.
- 3ha of predominantly blackwood in riparian zones.

Forest Management

- With the objective to maximise farm returns, the commercial planted tree stands (radiata pine and Leyland cypress) and shelterbelts (radiata pine) are managed with a high premium ‘clearwood pruning and thinning’ regime (Photos 12 & 13). My ‘conventional’ management regime includes; planting radiata pine at 1,100 trees per hectare, pruning selected trees to 6.5m (with a 10 – 12cm defect core) over three pruning visits and non-commercial and or commercial thinning (depending on market prices) to 250 trees per hectare. This maximises the value of the final crop trees. Recently I have modified this regime to protect the bark on young trees from being stripped by native browsing animals and now prune trees to retain the lowest whorl of branches to act as a barrier to bark stripping in the early years (Photo 14). Lower branches are removed after the bark has hardened up and is difficult for animals to strip.
- Fencing at considerable cost, both to build and maintain, proved essential to protect radiata pine from browsing damage (Photo 15). This was both unnecessary and unthought of when the original plantings were done in the preceding decade.
- Amenity and environmental blackwood plantings will, where possible, be managed for longer rotation high quality end uses (e.g. furniture, interior decorative/flooring panels and crafts).
- Pruning of the older Agroforestry radiata pine and the Leyland cypress was carried out by myself and my family. The younger plantings were pruned and thinned by contractors.
- I conduct forest management on all stands which are integrated into the farm and located on land either less suitable for pasture production, or to enhance pasture production through providing shelter and improved well-being of livestock.
- The native forest (Photo 16) on steep land is a prominent landscape backdrop to the State’s premier rowing course at Lake Barrington. I have retained it for conservation and public amenity values.
- In 2013 I had the report, Growth Monitoring Plots and Estimated Harvest Product Values and Volumes and Financial Returns, Private Forests Tasmania June 2013, (Attachment 7), prepared to assist estimate stand management strategies including harvest times, current value and future values at harvest ages of 20, 25, 30 and 35 years. The NPV and IRR are estimated. This analysis used the Farm Forestry Toolbox computer model. The full report is appended to show the detailed analysis and assumptions. This work indicates likely optimum harvest ages as shown in Table 3.
The blackwood plantings were established with a Stand Development Plan (Attachment 8) which specified the individual planting sites, seedling provenances, planting designs/spacing’s, establishment operations and silvicultural regimes for clear wood production.

In addition to conventional pruning to enhance wood quality I have had the shelterbelts regularly trimmed to ‘hedge them up’ to provide more uniform and useful shelter and to reduce both shading of pastures and stock camping close to the shelterbelts (Photos 17, 18 & 19).

Recent shelterbelt plantings have been ‘crowd planted’ (close spaced) (Photo 20). This design occupies little pasture, provides an excellent shelter and the hedge trimming and pruning provide quality logs.

I have been prepared to convert plantations (e.g. part of the pine Agroforest) after harvest to productive pasture and change planting designs of the replanted area (Photo 21).

Some of the earlier blackwood plantings required works to drain the site before tree planting could commence (Photo 22).

We have pruned most trees we considered to have value as clear wood for veneer manufacture or high end solid wood application including cypress pine (Photos 23 & 24).

Future management

The conventional radiata pine plantations are being managed with my ‘conventional’ regime; pruning to 6.5m and thinning to 250 stems per ha final crop. Due to economy of scale of the low volume of these small stands, they will be thinned to waste. The biological nutrient recycling from the thinned trees will benefit the pruned trees through extra growth and thus end up with larger piece sizes at clearfell.

Although the amenity/environmental blackwood plantings provide primary benefits like; soil erosion prevention, better water quality, wet land rehabilitation, shelter for stock and increased pasture growth; up to a third of the trees (with better form) will be pruned to produce “high premium” furniture/decorative/craft logs. Over time it has become unfortunately apparent that the form of the species provenance is less desirable than expected. That said, I will see how it goes.

Harvest Strategies

The Agroforestry radiata pine stands were planned to be commercially thinned to bring the stocking down to about 250 stems per hectare. Due to depressed log prices at the time and the 2008 global economic downturn, these stands were then clear-felled in 2014 (Photo 25). This decision was partially outweighed by the increased potential wind-throw risks in delaying the thinning operation by a few more years. Fortunately wind throw was minor.

<table>
<thead>
<tr>
<th>Stand (Species)</th>
<th>Year Planted</th>
<th>Age (years)</th>
<th>Estimated income ($/ha)</th>
<th>IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leyland Cypress</td>
<td>1992</td>
<td>30</td>
<td>$46,195</td>
<td>10.85</td>
</tr>
<tr>
<td>Radiata pine</td>
<td>1999</td>
<td>30</td>
<td>$43,096</td>
<td>10.48</td>
</tr>
<tr>
<td>Radiata pine</td>
<td>2000</td>
<td>27.5</td>
<td>$41,909</td>
<td>11.09</td>
</tr>
</tbody>
</table>
The plantation inventories are used to monitor stocking and tree growth and importantly estimate log volumes to help me with harvest options. The decision to modify the management regime in view of external circumstances has in hindsight proved to be correct as the harvest was quite profitable.

The Australian Master Tree Grower Inventory Spreadsheet (Attachment 9) uses the inventory data to estimate useful stand characteristics. For example the stand characteristics and estimations for one of 5 plots, last measured in 2012 (and due for re-measurement this winter), is:

**Australian Master Tree Grower Inventory Spreadsheet outputs**

<table>
<thead>
<tr>
<th>Plot Report</th>
<th>Species Report</th>
<th>Radiata</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot Area:</td>
<td>No in Plot</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Age</td>
<td>Stocking</td>
<td>320 t/ha</td>
<td>320 t/ha</td>
</tr>
<tr>
<td>Trees in Plot</td>
<td>% of the plot</td>
<td>100</td>
<td>100 %</td>
</tr>
<tr>
<td>Stand Density:</td>
<td>Mean DBHOB</td>
<td>35.5 cm</td>
<td>35.5 cm</td>
</tr>
<tr>
<td>Basal Area:</td>
<td>Mean Height</td>
<td>22.4 m</td>
<td>22.4 m</td>
</tr>
<tr>
<td>12.0 m3</td>
<td>Mean Pruned Height</td>
<td>0.0 m</td>
<td></td>
</tr>
<tr>
<td>239.5 m3/ha</td>
<td>Form 1</td>
<td>320 t/ha</td>
<td>320 t/ha</td>
</tr>
<tr>
<td>20.0 m3/ha/yr</td>
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*Roger & Outhay Poltock – Nomination Tree Farmer of the Year Award 2016 – Tasmania*
This shows that tree stocking of 320 stems per hectare (my current target stocking) has a merchantable stocking of about 339 cubic metres per hectare and while the distribution of tree diameters by tree number is quite acceptable at this age pending subsequent thinning to a lower final crop stocking.

**Marketing**

- In 2009 I envisaged the pruned Agroforestry radiata pine stands would be harvested sometime around 2015, dependent on the buoyancy of log price at the time. They were harvested in 2014 and generated a very acceptable log mix of 37% veneer logs, 35% sawlogs and 27% export logs.

  I engaged a well-established and reputable forest management company with a proven track record of harvesting/marketing small stands of trees from private land. I was engaged in all aspects of the sale process as well as the Forest Practices Plan for harvesting and replanting.

- The younger pruned radiata pine stands and shelterbelts will be due for harvesting towards the end of the 27 to 30 year rotation. A similar log mix is expected.

- Some of the better formed pruned blackwood of the amenity/environmental stands, although growing slower than expected and with a difficult tree form, may possibly be selectively harvested and sold to spot sawmilling buyers in future. These pruned trees need to be grown on to longer rotation (45 years plus) when the pruned butts achieve at least 50-60cm log size.

**Fire Strategies**

We are very conscious of fire and the potential damage it can cause. To protect forestry assets from fire:

- Radiata plantings are heavily grazed with sheep in the first few years then with cattle.
- Fire breaks dozed in alternate years in areas backing onto native forest.
- I plan to strategically and periodically cool burn the native forest to reduce the fuel load and to improve/maintain the natural ecology.

**NRM Benefits**

Benefits include:

- Plantations and windbreaks for timber production, stock shelter and increased pasture growth *(Photos 26 & 27).*
- All plantings demonstrate biodiversity and bird habitat values to varying degrees.
- Plantings around water dam and stream gullies - to enhance water quality for livestock and neighbouring downstream users. Livestock is permanently excluded by “4 strand” electric fencing.
- The ‘NRM plantings, in addition to the commercial plantings, increase the property value of
the farm and make for more comfortable working conditions.

- Aesthetics have been vastly improved across the farm landscape and this is pleasing to my family, local and interstate road users and visitors.
- On the down side, plantings have provided habitat for pademelon wallabies and brush tail possum, the numbers of which have increased significantly to pest proportions in the last 10 years and I have had to fence off new plantings at considerable cost to protect young trees from browsing by native animals. I have also employed some shooters to keep these animals at a more natural and manageable level.

**On-ground Works**

- Site preparation for planting has been done by a local dozer contractor and ripping by tractor.
- Until 2004 and after 2013, all spraying, planting, pruning, etc. had been carried out by myself and family members. Due to work commitments since 2004, pruning and thinning was contracted to Devonfield Enterprises (a specialist forestry workforce that gives young people with learning disabilities a chance in life) and implemented to specific standards so as to minimize the defect core and maximise optimum tree spacing to add value to the selected final crop trees.
- Windbreaks were high fan pruned by contractor in 2003 (192 Cradle Mountain Road) and more recent plantings in 2008 (201 Cradle Mountain Road).

**Communications**

- I was pleased to host a farm forestry field day on the property in November 2007 (jointly organised with Private Forests Tasmania) with an excellent turnout of farm foresters, tree growers and processors. This event was promoted and reported in the print media and ABC radio and encourages everyone to network and learn from each other ([Attachment 6 – Farm Forestry Field Day](https://example.com)). This event was also widely promoted and reported in PFT's newsletter, Treeline ([Attachment 5 – Treeline article](https://example.com)).
- When not working overseas, I have been involved as much as possible, and on a regular basis, with other “like minded” farm forestry people and attend Private Forests Tasmania farm forestry field days which have always been an inspiration for my own farm forestry activities.
- I have provided ongoing access to Private Forests Tasmania to establish multiple Permanent Sample Plots (PSP’s) in four intensively managed stands to monitor stand performance over time. This information combined with other data assists myself and other landholders estimate stand growth rates for specific management regimes.
- I attend the annual North West Tree Growers Group and PFT annual farm forestry dinners to learn about private forestry, to meet other forest owners and to share and exchange knowledge.
- Over many years I have welcomed visitors to my property to see and discuss what I have done (and am equally keen to learn from them).
- I am willing for this nomination to be reformatted and uploaded as a case study on the Private Forests Tasmania website to be shared with others.
- I am pleased to host a visit for delegates of the AFG National Conference as part of the pre-conference tour in October 2016.
I would hope that through my ‘one on one’ discussions with other farmers, forest growers, consultants and extension staff, I have imparted them with additional practical knowledge and inspiration.

Innovations

- My wide spaced agroforestry plantings were a very new practice at the time (and at which there was skepticism by some) and I took a considered leap of faith, but with timely pruning and management this enterprise proved profitable and demonstrated to others the potential of this planting configuration.
- On this property we combined browsing proof fencing, professional shooting and a modified silvicultural regime to pretty much overcome browsing animal damage to young trees enabling us to grow clearwood final crop trees from a young age.
- We used sacrificial nurse crops of *E. nitens* to assist the cypress grow straight and minimise branch size, when many others considered that nurse crops had to be commercially harvested.
- We deliberately set up and purposefully managed our forestry enterprise to produce an income stream to off-set expected downturns in off-farm income.
- We have ‘crowd planted’ the new shelterbelts to minimise use of productive pasture and will prune and thin these trees to provide optimum shelter and ultimately future logs.
- I have modified the standard forestry lift pruning regime to retain ‘browsing skirts’ (i.e. the lowest whorls of branches close to the ground are retained) for a few years to deny browsing animals opportunity to strip bark from the trees and with little if any compromise to wood quality.

Learnings

- The 3 ‘P’s’, planning, preparation and perseverance, are the key to our success. But if not enough effort is put into planning and preparation, it then takes a disproportional amount in effort and further investment to achieve the end results. There is nothing worse than failures in farm forestry, albeit, these are often valuable learning opportunities!
  I am sure many tree growers identify with a favorite old Chinese proverb of mine, ‘The best time to plant a tree was 20 years ago - the second best time is now’ *(Photo 28).*
- Spend time carefully planning how to integrate forestry and agriculture to maximise all round benefits – it does pay dividends!
- Be prepared to match species and silviculture to site as well as forest and agricultural objectives.
- Have an end goal (e.g. to grow high value clear wood) and stick to it so as to capitalise on the return on your time and financial investment.
- Continuously monitor tree growth and do the sums (wood volumes and current and future value) to help refine management regimes and better estimate harvest times.
- Don’t be afraid to seek professional advice before undertaking planting and management activities.
- Get involved in the local ‘farm forestry industry’ to learn from others and share experiences.
ATTACHMENTS

1. Locality Map
2. Property image prior to tree planting
3. Property Plan (current) showing extant and location of tree plantings and stands and photo points
4. Photos
5. Treeline article
6. Farm Forestry Field Day, Poltock’s Property Wilmot, November 2007 – Field Day Notes
8. Stand Development Plan - Blackwood
9. Example of Australian Master Tree Grower Inventory Spreadsheet inputs and outputs. (Plot 1, E 430608 N 5415256, 2012)
Attachment 4: Photos

Photo 1:
Portable sawmilling of some of the native forest edge tree logs recovered from the harvested section. This area is now a commercial radiata pine woodlot (265 Cradle Mountain Road) (about 1985).

Photo 2:
20 year old radiata pine Agroforest - 3 rows radiata pines between 20m alleys of grass – a radical departure at the time from the standard ‘1,100 stems per hectare farm forestry’. (192 Cradle Mountain Rd) (Field day 2007).
Photo 3:
Roger Poltock and well-managed Leyland cypress (15 years old). The alternate rows of *E. nitens* nurse crop were thinned several years ago following final pruning. (192 Cradle Mountain Road) (2002 approximately).

Photo 4:
Roger Poltock in the harvested pine Agroforest part of which has been replanted to pine. No cultivation was possible and the seedlings were planted between the stumps or in the bays at 1,000 trees per hectare. (192 Cradle Mountain Road) (2016).
Photo 5:
Harvesting cutover degraded native forest now converted to a radiata plantation. (201 Cradle Mountain Road) (about 2000).

Photo 6:
Roger in a second lift pruned 6 year old radiata pine stand which was planted on the converted native forest site. (201 Cradle Mountain Road) (2007).
Photo 7:
An 8 year old radiata pine stand, recently third lift pruned and thinned, planted on marginal sandy soil (ex-native forest). (265 Cradle Mountain Road) (Field Day 2007).

Photo 8:
Roger with CEO Private Forests Tasmania and PFT staff, admiring the good growth of a well managed 8 year old stand recently thinned to waste. (265 Cradle Mountain Road) (2007).
Photo 9:
Roger with the 6 year old environmental Blackwood planted along streamside and wet area, just below a water dam outlet after initial form and lift pruning. Then the intention was to manage up to a third of the trees with better form for longer rotation high premium logs. (201 Cradle Mountain Road) (2008).

Photo 10:
Dead and dying pine trees are the result of native animal browsing damage (bark stripping) and this, in addition to fencing, has necessitated innovative silvicultural practices to cull, prune and thin trees from an early age to reduce browsing by native animals. (Egmont) (2016).
Photo 11:
Riparian plantations of local native species for erosion control, biodiversity, shelter and amenity. (Egmont) 2016).

Photo 12:
A textbook example of an intensively managed pine plantation, now pruned to 6.5 m and first thinned. (201 Cradle Mountain Road) (2016).
Photo 13: Radiata pine high pruned and awaiting thinning – includes permanent sample plots for on-going monitoring of productivity. (265 Cradle Mountain Road) (2016).

Photo 14: ‘Intervention pruning’ with retention of the lower branch whorls (‘browsing skirts’) to impede access to the tree trunk by native browsing animals (Egmont) (2016).
**Photo 15:**
Browsing by native animals has increased over the years and is now intense. “Browsing proof” fencing, secured to the ground, is required to protect young trees. (192 Cradle Mountain Road) (2016).

**Photo 16:**
Regrowth native forest in the native forest set aside for conservation and public landscape amenity. (265 Cradle Mountain Road) (2016).
Photo 17:
High trimming radiata pine shelterbelt (201 Cradle Mountain Road) (2008).

Photo 18:
The effect of hedge trimming are evident – continuous uniform shelter from the ground to tree tops, fences free of overhanging branches, reduced shading and control of stock camping. (201 Cradle Mountain Road) (2016).
Photo 19:
Well established two row pine shelterbelts repeatedly trimmed to reduce branch size, shading of pastures and stock camping. (201 Cradle Mountain Road) (2016).

Photo 20:
One of a number of strategically located alternate two row pine shelterbelts established to provide shelter to pasture and livestock. This design occupies little pasture, provides an excellent shelter and the hedge trimming and pruning provide quality logs. In this climate the pines will easily outcompete the grass. (192 Cradle Mountain Road) (2016).
Photo 21:
The background hill was the site of the alley style pine agroforest. The lower slope of this hill was converted to pasture and the upper slope, being less arable ground, was replanted to conventional plantation – land use and silviculture change according to need. (201 Cradle Mountain Road) (2016).

Photo 22:
Draining wet area prior to planting Blackwood (201 Cradle Mountain Road) (2001).
Photo 23:
First pruning lift cypress with *E. nitens* nurse crop. (192 Cradle Mountain Road).

Photo 24:
Photo 25:
Former radiata pine Agroforest (foreground) clear felled and part converted to pasture. (192 Cradle Mountain Road) (2016).

Photo 26:
Multiple land use – Grazing pasture and cattle, with radiata pine shelterbelt. The woodlot on the hill in the background is the 1988 pine Agroforest (201 Cradle Mountain Road) (2007).
Photo 27:

Photo 28:
Roger Poltock. “The 3 “P”s”, planning – preparation – perseverance is the key to our success and I am sure many tree growers identify with a favorite old Chinese proverb, ‘The best time to plant a tree was 20 years ago. The second best time is now’ (2016).
The symbiosis of forestry and farming

On a warm November day over 40 people gathered to be inspired by one farmer’s innovative journey into integrating farm forestry with his livestock production. Wilmot, in Tasmania’s north-west, is 350 metres above sea level, has an annual rainfall of 1100mm and with the rich predominantly red basalt soils, the spring growth was green and lush. Roger Pollock’s property comprises 105 hectares, with 17ha native forest and 25ha being planted to trees in a mixture of permanent and commercial shelterbelts and woodlots. Most of the plantings have been established on the more ‘difficult’ non-farmable areas on the property, where there are poorer shallower soils, stony slopes, areas prone to weed infestation or waterlogging and around dams and watercourses. The remaining 63ha of prime agricultural land is dedicated to rearing beef cattle. The Farm Forestry Field Day, organised by Henry Chan (NW Private Forest Advisor), is an annual event where farm foresters, tree growers and processors can network and learn from each other. The inspiration from the day came from learning about the full range of farm forestry options Roger has embraced and there is truly a rich tapestry in design and management techniques adopted across the property (see Plate 1). Six different sites were visited varying in type, condition, tree species, stand management and intended end product outcome. Four sites incorporated Radiata Pine (*Pinus radiata*) planted for high-value sawlogs and for shelter. Roger maintains his shelterbelts to the same high standard as he does his woodlots and all with the aim of getting a return for the well-managed trees, as well as improving the returns from his livestock production.

Roger explained that “Returns come both in financial benefits from the timber product and also from the environmental services the trees provide to the property and the wider catchment.” Roger further explained what these environmental services include, i.e: protection from wind, frost and solar radiation; reducing soil loss where top soil is thin; lowering the water table in waterlogging-prone areas; improving water quality; and increasing biodiversity across the landscape. The trees have brought a direct benefit to his livestock production “I’ve noticed that up to 30-40 metres out from the trees the summer pastures hold their moisture much better; this has really helped with my stocking rates.” Roger said.

One of the Pollocks’ early ventures into farm forestry was the establishment in 1992 of a Leyland Cypress.
(Cupressocyparis leylandii) plantation. The photograph in Plate 2 shows a view through this well-managed site looking across the property. The Cypress were planted with alternate rows of Shining Gum (Eucalyptus nitens), as a nurse, or companion, crop to help the Cypress grow better-formed trunks and smaller branches. A major issue for discussion at this site was the importance of managing a tree crop over its life, in order to maximise the return for the investment. Pruning, thinning, nurse crops, pest control and fertiliser application are all key components, which can make or break a high-value long-term crop. The consensus was that sound planning at the beginning of the enterprise minimises risk and helps ensure that the trees grow to their maximum height and diameter, stay healthy and provide a good return.

The four Radiata Pine sites ranged from an excellent example of Alley Farming, the ‘Agroforestry’ concept promoted widely in the 1980s, to shelterbelts and more recent larger plantations on dry rocky slopes. Discussions at these sites focussed on management techniques, market availability and wastage, especially from thinnings and prunings. Forest Enterprises Australia’s Sven Rand explained that his company’s Finnish Hew Saw is able to produce high-grade sawlogs from small diameter logs for their new product lines Bass Pine™ and EcoAsh™. This allows for thinnings and younger-age trees to be harvested for good commercial returns, opening opportunities for growers in the future.

In 2001 and 2002 Blackwoods (Acacia melanoxylon) were planted in various locations across the Pollock property, with assistance from a Natural Heritage Trust grant program, managed by Private Forests Tasmania. The aim of the Blackwoods was to stabilise some of the more unproductive ‘tricky’ areas on the property such as: weedy and rocky outcrops; riparian areas around dams and watercourses; and sites prone to waterlogging.

Although only 5-6 years old, the Blackwoods are already providing a stabilising benefit to these non-productive sites on the property. In the long term, with proper management, these blackwoods could produce high quality premium logs for decorative veneer, furniture, joinery, moulding, panelling, boat building and other premium timber products.

The field day was considered a success by all who attended and by the host who reflected that farmers usually work alone and it’s easy to lose sight of the bigger picture. “Field days like this help bring it home just what you’re accomplishing,” Roger said, “It’s very rewarding when you get such good feedback from fellow farmers.”

Janice Miller
Project Manager, Grants Program
Farm Forestry Field Day
Poltock’s Property, Wilmot

Presented by
Private Forests Tasmania
15 November 2007

Agenda:

Introduction
Henry Chan, NW Private Forest Advisor
Andy Warner NW Regional Forester resigned from PFT
Graham Sargison – new PFT CEO
Welcome other PFT staff

Poltock’s Property
Roger Poltock, managing farm with trees

Stop 1
Leyland Cypress (Cupressocyparis leylandii) 1992 planting
Conventional Radiata Pine (Pinus radiata) 1988 planting
Shelterbelt Radiata Pine (Pinus radiata) 1986 planting
Blackwood (Acacia melanoxylon) 1988 planting

Stop 2
Agroforestry - Radiata Pine (Pinus radiata)
1987 planting and 1988 planting

Stop 3
Blackwood (Acacia melanoxylon) 2001 planting; 2002 planting
View towards 1999 Radiata stand due south – thinned (2007)

BBQ Lunch – Organised by Tracey King, PFT NW Administration Officer

Stop 4
Shelterbelt - Radiata Pine (Pinus radiata) 2001 planting
Pruning demo

Stop 5
Conventional - Radiata Pine (Pinus radiata) 2001 planting

Conclusion
Active Management
Farm Forestry Toolbox - New Version 5
Roger Poltock - background
- Geologist; contract work for many years in Tasmania; 1994 contract work in Philippines, Argentina, Chile; 2003 Laos, Cambodia, Thailand, China. Last 2 years employed by Oxiana Australia Mining Company.

Poltock’s Property, Wilmot
Total property area = 100 hectares
Soils/Geology – Basalt Red Soils with 10% of Sandstone Acid Sandy Soil (Forth River side)
Rainfall = 1100mm per annum
Altitude – 350m above sea level

Production:
- Grazing pasture = 70 hectares – 120 head Angus/Hereford Cattle.
- Strategy – maximise land use by planting up non-farmable areas that are steep, headwater, streamside. Important to fence off trees from stock
- Plantation Woodlots and shelterbelts = 25 hectares on non-farming areas (steep, rocky, head-catchment drainage and streamsides)
- Native forests – 15 hectares (Forth River catchment)

Benefits of Farm Woodlots and shelterbelts
- Maximise land use – to utilise the areas not suitable for farming (i.e. steep, rocky, drainage and stream, around water dam and other non-productive areas)
- Provide shelter for the beef cattle during the cold windy days
- Microclimate for better pasture growth; reduction of soil evaporation
- Amenity/Soil/water protection around water holes and swamp/stream sides
- Financial returns – well managed and tended trees at the end of the rotation generate a return to the landowner.

Tree Species Suitable for Farm Woodlots
Species planted on this property are:
- Radiata Pine (*Pinus radiata*)
- Leyland Cypress (*Cupressocyparis leylandii*)
- Blackwood (*Acacia melanoxylon*)
- Shining Gum (*Eucalyptus nitens*)

There are other suitable woodlot trees for the North West region.
- Coastal Redwood (*Sequoia sempervirens*)
- Mexican Cypress (*Cupressus lucitanica*)
- Monterey Cypress (*Cupressus macrocarpa*)
- Western Red Cedar (*Thuja plicata*)
- Douglas Fir (*Pseudotsuga menziesii*)
- Stringy Gum (*Eucalyptus regnans*)
- Western Hemlock (*Tsuga heterophylla*)
- Stringybark (*Eucalyptus obliqua*)
- Yellow Stringybark (*Eucalyptus meulleriana*)
Landowners need to consider which species are better suited to their specific locations. Choice of species is dependant on soil types, rainfall, aspect, climate, benefits, etc. Seedlings are readily available from nurseries – Woodlea Nursery (Scottsdale), Redbreast Plants Nursery (Flowerdale) and Habitat Nursery (Liffey). A range of information sheets are available from Private Forests Tasmania offices and on the website [www.privateforests.tas.gov.au](http://www.privateforests.tas.gov.au).

**Field Tour**

**Stop 1**

[Leyland Cypress (*Cupressocyparis leylandii*)](#)
1992 planting (0.7ha) – alternate rows of nurse crop *Eucalyptus nitens*.
Pruning 3 or 4 lifts – carried out by landowner and family members using 10cm or 4 inches gauge system. Trees were pruned on the “as required basis” i.e. bigger and taller trees pruned first. Nurse crop were thinned to waste about 4 years ago, removed from site.

Dominant trees (age 15)
- DBH = 32.5cm
- Total Height = 14.8m
- Pruned Height = 6.5m

[Conventional Radiata Pine (*Pinus radiata*)](#)
1988 planting (0.3ha) – Pruned to 6.0 to 6.5m.

[Shelterbelt Radiata Pine (*Pinus radiata*)](#)
1986 planting (0.4ha) – shelter for the house; some pruned (for clearwood return); hedge-trimmed (to reduce grass growth loss)

Note: unpruned trees lower branches still close the gaps of the pruned trees; i.e. still maintaining sheltering efficiency

[Blackwood (*Acacia melanoxylon*)](#)
1988 planting (0.2ha) – planted on headwater; steep; non-farmable terrain.
Although not form-pruned, this shows that conventional spacing can produce good enough form for clearwood management (e.g. Stop 3 young stand).

**Stop 2**

[Agroforestry - Radiata Pine (*Pinus radiata*)](#)
1987 planting (7.3ha)

Dominant Pruned trees parameters (age 20):
- DBH = 51cm
- Total Height = 27.3m
- Pruned Height = 6.5m

Originally the agro-forestry concept was adopted from New Zealand in the early 80s, to maintain grazing return in the wide spacing bays, with longer term return from wood production. Roger estimated he has up to 12 years of full rotation grazing, and this has now reduced to about 10% grazing.
A commercial thinning operation is scheduled in early 2008 to extract the smaller trees (both the unpruned and some excess pruned).

- Volume 60-70 tonnes per hectare
- Potential stumpage returns:
  - Micro logs 20% = $20/tonne
  - Knotty sawlogs 20% = $28/tonne
  - Pulplogs 60% = $10/tonne

Note: Comparing to conventional stands, although this thinning is late, there is still minimal windthrow risk, as the trees are already wind-firmed with the wide bays. Also growth loss to pruned dominants is minimal with the good growing conditions provided by the wide bays.

**Stop 3**
Blackwood (*Acacia melanoxylon*) 2001 planting (0.5ha)
- Planted in swampy/drainage terrain
- Environmental benefits – soil erosion control; cleaner quality water for domestic intakes downstream; fauna protection downstream.
- Future longer term financial return – potential premium clearwood production.

Although no nurse crop (e.g. *Eucalyptus nitens*) was planted, there are still enough potential good form trees for clearwood management. The important thing is to carry out form-pruning (i.e. removal of the odd large branches). Provenance can be a factor influencing tree-form. As you drive to the barn, look at the younger 2002 planting, are there more better form trees?

View towards a well pruned and thinned stand of Radiata stand due south – planted 1999; thinned (March 2007).

**Stop 4**
Shelterbelt - Radiata Pine (*Pinus radiata*) 2001 planting (staggered 2 rows)
- Benefits – shelter to cattle in cold windy conditions; increased pasture growth; reduction of soil moisture loss; longer term return from higher premium clearwood (as well as other log types).

Pruning demonstration – by Barry Graue and his crew. Important to use experienced workforce and correct tools.

**Stop 5**
Conventional - Radiata Pine (*Pinus radiata*) 2001 planting (5.6ha)
- Ex-native forest on poorer terrain – mixture of basalt and sandstone acidic soils, with an area of rocky knoll with poor growth trees.

2nd prune lift just finished last month. Third lift is expected 12-18 months, followed by thinning to waste.
Benefits:
- conversion of non-farmable cutover forest to production woodlot
- return from the logging the cutover native forest
- longer term return from mature woodlot

Active Tree Management – pruning & thinning
Due to the economy of scale, small woodlots need to be actively managed for the high premium “niche markets”. Silviculture pruning and thinning operations should be planned and scheduled properly in order to produce maximum volume of high value “knot free” clearwood logs. Refer to the PFT “Pruning – do it right” display poster for further details.

Active management also entails making sure the trees are growing to their potential growth rate. Trees need to be healthy to have maximum growth. Health can be influenced by nutrient availability, pests and diseases. The Farm Forestry Toolbox” CD provides information and guidelines on various common nutritional, pest and disease symptoms. Soil and foliage samples can be analysed to find out specific nutrient deficiency and fertiliser requirements. Landowners need to seek professional advice on specific symptoms.

Growth Monitoring
Trees on your farm are a valuable asset. You need to keep track of tree growth just like you do for your livestock or crops. You need to make sure they are growing at their maximum potential to give you the best returns.

The Farm Forestry Toolbox CD is a one stop measurement shop - it contains a helpful tree measurement manual as well as the Toolbox program that will store and analyse your tree measurements. There are plenty of examples to help you use these aids.

Contact Private Forests Tasmania for more information or help with the Toolbox or tree measurement.

NEW Version 5 - Farm Forestry Toolbox
The launching of the new Version 5 unfortunately has been delayed until the end of 2007 or early 2008. Please contact Tracey King to order your FREE copy.

A new feature of version 5 is the ability to import and rectify images of your property and then use them for your woodlot and farm management. Farm foresters and tree growers will soon be able to purchase Quickbird Satellite Imagery images from Private Forests Tasmania.
Growth Monitoring Plots and Estimated Harvest Product Values and Volumes and Financial Returns

Plantations of Roger and Outhay Poltock
192 Cradle Mountain Road
Wilmot, TAS 7310

By
Henry Chan, Private Forest Advisor
Arthur Lyons, Manager Services
Private Forests Tasmania
June 2013

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<td>6</td>
</tr>
<tr>
<td>Regime Operation Costs</td>
<td>6</td>
</tr>
<tr>
<td>Log Grade Set</td>
<td>6</td>
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<tr>
<td>Financial Analysis and Returns</td>
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<tr>
<td>What is the Ideal Clearfell Age?</td>
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</tr>
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<td>Leyland Cypress (<em>Cupressocyparis leylandii</em>) Stand (1992)</td>
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<tr>
<td>Stand Summary</td>
<td>8</td>
</tr>
<tr>
<td>Regime Operation Costs</td>
<td>8</td>
</tr>
<tr>
<td>Log Grade Set</td>
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</tr>
<tr>
<td>Financial Analysis and Returns</td>
<td>9</td>
</tr>
<tr>
<td>What is the Ideal Clearfell Age?</td>
<td>9</td>
</tr>
<tr>
<td>Farm Forestry Toolbox disclaimer</td>
<td>10</td>
</tr>
<tr>
<td>Glossary</td>
<td>10-12</td>
</tr>
</tbody>
</table>
Growth Monitoring Plots and Estimated Harvest Product Values and Volumes and Financial Returns

Introduction
In January 2013, staff of Private Forests Tasmania (PFT), Arthur Lyons, David Bower and Henry Chan visited the plantations of Roger and Outhay Poltock in Wilmot. The primary reason was to establish and remeasure several growth monitoring plots. With the aid of the Farm Forestry Toolbox package, plot measurements were analysed to determine regimes and forest management options. In the medium to long term, these growth plot data sets will be used (along with data from other properties), to improve existing growth models in the Farm Forestry Toolbox. As well, it is envisaged to utilise growth data to produce new growth models for some species.

Establishment of Growth Monitoring Plots
Last year, three measurement plots were established, two in the 2000 planted Radiata Pine (Pinus radiata) stand and one in the 1992 planted Leyland Cypress stand. These three plots were remeasured this year. Another new plot was established this year in the 1999 planted Radiata Pine stand. This plot is on a poorer site, and is a comparison for the 2000 planted stand.

Application of the Farm Forestry Toolbox
The growth plot data, along with fixed assumptions like log types (e.g. peelers, pruned sawlogs, export logs, pulp logs, etc.) and current prices, and the operational costs (e.g. costs of land preparation, planting, seedlings, pruning and thinning, fertiliser, etc.) were analysed with Toolbox to estimate the Net Present Value (NPV) and Internal Rate of Return (IRR%) for each of the 4 to 5 clearfelling ages, using discount and compound rate of 5%. The same stand regime was used for each clearfelling age. This exercise was carried in each of the three measured stands; 1999 Radiata Pine; 2000 Radiata Pine and 1992 Leyland Cypress. Each stand is analysed and reported separately below.

Using NPV and IRR in Decision Making
One important decision for a tree grower is to estimate the clearfell harvest age so as to maximise the returns on money invested. The Toolbox financial analysis is outlined in Tables 4, 8 and 12. In long term forestry investments, many foresters prefer to harvest trees at the clearfell age when the Net Present Value (NPV) is highest. This is based on fixed assumptions of current log prices, operational costs, log mix and growth model projected volume. The NPVs and clearfell age from Tables 4, 8 and 12 are graphed for each stand. The graph has been smoothed (refer to Graphs 1, 2 and 3). The ideal harvest age is when the NPV peaks.

IRR is determined by finding the interest rate or discount rate that equates the present value of benefits with the present value of costs. The higher the indicated IRR on the investment, the more attractive the project, as it maximises the return of monetary capital.

A note of caution: It is advisable not to use IRR by itself as a deciding factor, but rather to use it to supplement NPV results, especially for long term investments like a rotation of trees.
**1999 Pinus radiata Stand**

**Stand Summary**
Table 1 outlines the stand summary at the time of plot measurement (January 2013). The randomly established plot fell in an area which is quite highly stocked at 517 stems/ha. The overall stand stocking is closer to 400 stems/ha.

<table>
<thead>
<tr>
<th>Table 1: 1999 Radiata Pine Stand Summary (January 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Mean DBHob</td>
</tr>
<tr>
<td>Stocking</td>
</tr>
<tr>
<td>Basal Area</td>
</tr>
<tr>
<td>Mean Dominant Height</td>
</tr>
<tr>
<td>Mean Annual Increment</td>
</tr>
<tr>
<td>Total Volume</td>
</tr>
<tr>
<td>Stand Value</td>
</tr>
</tbody>
</table>

The slower growth rate of this stand is reflected by the average tree volume of 0.58 m³ for the age, due to the poorer quartz-sandy soil (compared with the nearby stand on basalt red soil, which is a year younger, with a much larger tree volume of 0.76 m³/tree, being 31% larger).

Based on the current market log stumpage prices (i.e. net in hand) in Table 3, the value of the stand is $5,055/ha; which is a bit lower than the 2000 stand valued at $5,429/ha (refer to Table 5).

**Regime operation costs - 25 years clearfell age**
Table 2 outlines the various operations that occurred during the rotation of the stand, with their corresponding standard costs. These costs were analysed by the Toolbox to generate the estimated Revenue, NPV and IRR for 25 years clearfell age. Other clearfell ages were also analysed with their corresponding returns summarised in Table 4. Note the discount rate used is 5%.

<table>
<thead>
<tr>
<th>Table 2: - 1999 Radiata Pine Regime Operation Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>1/06/1999</td>
</tr>
<tr>
<td>1/06/1999</td>
</tr>
<tr>
<td>1/08/1999</td>
</tr>
<tr>
<td>1/08/1999</td>
</tr>
<tr>
<td>3/08/1999</td>
</tr>
<tr>
<td>1/08/2004</td>
</tr>
<tr>
<td>1/08/2006</td>
</tr>
<tr>
<td>1/08/2008</td>
</tr>
<tr>
<td>31/08/2008</td>
</tr>
<tr>
<td>2/06/2024</td>
</tr>
<tr>
<td>1/08/2024</td>
</tr>
</tbody>
</table>
**Log Grade Set**

Table 3 outlines the current market log price stumpages (i.e. net price paid to the landowner, less harvesting and cartage costs) and specifications for the various log types for this stand.

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Length Min (m)</th>
<th>Length Max (m)</th>
<th>SED Min Dub (cm)</th>
<th>LED Min Dub (cm)</th>
<th>Value $/m³</th>
<th>Preferred Length Step (cm)</th>
<th>Overcut Length (cm)</th>
<th>Pruned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawlog Pruned</td>
<td>SP</td>
<td>2.7</td>
<td>6.0</td>
<td>30.0</td>
<td>999.0</td>
<td>84.00</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Grade</td>
<td>A</td>
<td>2.7</td>
<td>11.0</td>
<td>30.0</td>
<td>999.0</td>
<td>32.50</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K Grade</td>
<td>K</td>
<td>2.7</td>
<td>11.0</td>
<td>20.0</td>
<td>999.0</td>
<td>9.50</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KL Export</td>
<td>KL</td>
<td>2.7</td>
<td>11.0</td>
<td>30.0</td>
<td>999.0</td>
<td>7.00</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulp</td>
<td>P</td>
<td>2.4</td>
<td>11.0</td>
<td>10.0</td>
<td>999.0</td>
<td>1.00</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>X</td>
<td>0.0</td>
<td>999.0</td>
<td>0.0</td>
<td>999.0</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Financial Analysis and Returns**

The stand regime operation costs (Table 2) and the current log prices (Table 3) were analysed by the Toolbox for a range of clearfell age classes. All past and future costs, and revenues during the rotation are either compounded forward or discounted back to the present day value (at 5% in this exercise). The returns for the various clearfell ages are detailed in Table 4.

![Graph 1](image)

**Table 4 – Revenue, Net Present Value and Internal Rate of Return**

<table>
<thead>
<tr>
<th>Clearfell age (yrs)</th>
<th>Revenue ($/ha)</th>
<th>NPV ($/ha)</th>
<th>IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>20,544</td>
<td>4,888</td>
<td>12.10</td>
</tr>
<tr>
<td>25</td>
<td>32,332</td>
<td>6,741</td>
<td>11.55</td>
</tr>
<tr>
<td>30</td>
<td>43,096</td>
<td>7,203</td>
<td>10.48</td>
</tr>
<tr>
<td>35</td>
<td>52,566</td>
<td>6,792</td>
<td>9.43</td>
</tr>
</tbody>
</table>

It is clear that the revenue increases with greater clearfell age, due to increased total stand volumes and higher ratio of high value pruned logs and sawlogs.

**What is the ideal clearfell harvest age?**

Table 4 illustrates the estimated returns from this stand. Clearfell age and NPV are graphed in Graph 1. This stand offers the highest NPV about 29 years, where NPV peaks. The high IRR indicates this stand of trees is a very attractive project with good return on invested costs.
2000 *Pinus radiata* Stand

**Stand Summary**
Table 5 outlines the stand summary at the time of plot measurement (January 2013). The fertility of the red soil is reflected by a mean DBH of 35.9cm and tree volume of 0.76m³/tree; when compared to the older 1999 stand, with smaller DBH of 32.6cm and average tree volume of 0.58m³/tree. These differences are due to soil fertility.

Based on the current market log stumpage prices in Table 7, the value of the stand is $5,429/ha; being higher than the older 1999 stand with $5,055/ha.

**Table 5 – 2000 Radiata Pine Stand Summary (January 2013)**

<table>
<thead>
<tr>
<th>Age</th>
<th>12.5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean DBH</td>
<td>35.9 cm</td>
</tr>
<tr>
<td>Stocking</td>
<td>330 stems/ha</td>
</tr>
<tr>
<td>Basal Area</td>
<td>33.5 m²/ha</td>
</tr>
<tr>
<td>Mean Dominant Height</td>
<td>23.5 m</td>
</tr>
<tr>
<td>Mean Annual Increment</td>
<td>20.1 m³/ha</td>
</tr>
<tr>
<td>Total Volume</td>
<td>251 m³/ha  (average tree volume = 0.76m³/tree)</td>
</tr>
<tr>
<td>Stand Value</td>
<td>$5,429/ha  (based on market log prices in Table 7)</td>
</tr>
</tbody>
</table>

**Regime operation costs**
Table 6 lists the various operations and standard costs for 30 years rotation. These costs were analysed by the Toolbox to generate the estimated Revenue, NPV and IRR. Other clearfell ages were also analysed with their corresponding returns summarised in Table 8. Note the discount rate used is 5%.

**Table 6: - 2000 Radiata Pine Regime Operation Costs**

<table>
<thead>
<tr>
<th>Date</th>
<th>Yrs</th>
<th>Age</th>
<th>Event</th>
<th>Description</th>
<th>Cost $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/06/2000</td>
<td>-0.16</td>
<td>-0.2</td>
<td>Spraying</td>
<td>pre plant spraying</td>
<td>120 ha</td>
</tr>
<tr>
<td>1/06/2000</td>
<td>-0.16</td>
<td>-0.2</td>
<td>Nursery costs</td>
<td>seedling $350/1000</td>
<td>350 ha</td>
</tr>
<tr>
<td>1/08/2000</td>
<td>0.00</td>
<td>0.0</td>
<td>Planting</td>
<td>SPH(1000); [Survival 100%]</td>
<td>150 ha</td>
</tr>
<tr>
<td>3/08/2000</td>
<td>0.01</td>
<td>0.0</td>
<td>Fertilizing</td>
<td>© MARKER; {NO3(0); NH4(0); UREA(0)}</td>
<td>400 ha</td>
</tr>
<tr>
<td>2/08/2005</td>
<td>5.00</td>
<td>5.0</td>
<td>Pruning</td>
<td>Lift 1; 3m; 330 SPH</td>
<td>600 ha</td>
</tr>
<tr>
<td>2/08/2007</td>
<td>7.00</td>
<td>7.0</td>
<td>Pruning</td>
<td>Lift 2; 5.5m; 330 SPH</td>
<td>600 ha</td>
</tr>
<tr>
<td>2/08/2009</td>
<td>9.00</td>
<td>9.0</td>
<td>Pruning</td>
<td>Lift 3; 8.9m; 330 SPH</td>
<td>600 ha</td>
</tr>
<tr>
<td>1/09/2009</td>
<td>9.08</td>
<td>9.1</td>
<td>Thinning</td>
<td>© T1; Waste; Out 0; 330 SPH;</td>
<td>500 ha</td>
</tr>
<tr>
<td>2/08/2030</td>
<td>29.84</td>
<td>29.8</td>
<td>Forest Practices Plan</td>
<td>Forest Practices Plan</td>
<td>600</td>
</tr>
<tr>
<td>2/08/2030</td>
<td>30.00</td>
<td>30.0</td>
<td>Clear felling</td>
<td>Commercial;</td>
<td>0 ha</td>
</tr>
</tbody>
</table>

**Log Grade Set**
Table 7 outlines the current market log price stumpages (i.e. net price paid to the landowner, less harvesting and cartage costs) and specifications for the various log types for this stand.
Financial Analysis and Returns

The stand regime operation costs (Table 6) and the current log prices (Table 7) were analysed by the Toolbox for a range of clearfell age classes. All past and future costs, and revenues during the rotation are either compounded forward or discounted back to the present day value (at 5% in this exercise). The returns for the various clearfell ages are detailed in Table 8.

Table 8 – Revenue, Net Present Value and Internal Rate of Return

<table>
<thead>
<tr>
<th>Clearfell age (yrs)</th>
<th>Revenue ($/ha)</th>
<th>NPV ($/ha)</th>
<th>IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>25,168</td>
<td>6,630</td>
<td>13.52</td>
</tr>
<tr>
<td>25</td>
<td>36,627</td>
<td>8,010</td>
<td>12.21</td>
</tr>
<tr>
<td>30</td>
<td>47,192</td>
<td>8,152</td>
<td>10.87</td>
</tr>
<tr>
<td>35</td>
<td>56,253</td>
<td>7,462</td>
<td>9.67</td>
</tr>
</tbody>
</table>

The revenue increases with clearfell age, due to increased stand volumes and higher ratio of higher value pruned logs and sawlogs. Based on all the fixed assumptions (i.e. costs, volume log mix) this stand offers quite high returns even at 20 years clearfell age.

What is the ideal clearfell harvest age?

From Graph 2, it is clear the smoothed curve peaks at about $8,500 between 27 and 28 clearfell age. This will change if any changes are made to the above mentioned fixed assumptions.
1992 Leyland Cypress Stand

**Stand Summary**

Table 9 outlines the stand summary at the time of plot measurement (January 2013). This stand has been admired by forestry visitors, including the late Ian Nicholas (the New Zealand expert in Specialty Species, passed away in March 2013) who toured this stand with a couple of Chilean foresters 2 years ago. The well managed stand has good-form pruned trees; a credit to Roger Poltock for his dedication in pruning the Cypress trees and thinning out the alternate rows of *Eucalyptus nitens* nurse crop. The fertile basalt red soil contributes to the good growth rate of the stand. Unfortunately the removal of the nurse crop rows following final pruning of the cypress contributed to the large branches in the immediate whorl just above the pruned section of many trees. Fortunately crown canopy closure therefore has substantially restricted this branch growth.

Based on appropriate market log prices in Table 11 (in line with New Zealand sales), the current stand value at age 20 is $23,923/ha. Ian Nicholas during his last visit, commended on the good growth rate, with an attainable 30 year rotation. This is what the Toolbox estimated for this stand (refer to later section on Financial Analysis and Results).

**Table 9: 1992 Leyland Cypress Stand Summary (January 2013)**

<table>
<thead>
<tr>
<th>Age</th>
<th>20.5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean DBHob</td>
<td>40.4 cm</td>
</tr>
<tr>
<td>Stocking</td>
<td>267 stems/ha</td>
</tr>
<tr>
<td>Basal Area</td>
<td>34.2 m²/ha</td>
</tr>
<tr>
<td>Mean Dominant Height</td>
<td>21.0 m</td>
</tr>
<tr>
<td>Mean Annual Increment</td>
<td>14.2 m³/ha</td>
</tr>
<tr>
<td>Total Volume</td>
<td>291 m³/ha (average tree volume = 1.08 m³/tree)</td>
</tr>
<tr>
<td>Stand Value</td>
<td>$23,923/ha (based on market log prices in Table 11)</td>
</tr>
</tbody>
</table>

**Regime operation costs**

Table 10 outlines the various operations and their corresponding standard costs for this stand at clearfell age of 25 years

**Table 10: - 1992 Leyland Cypress Regime Operation Costs**

<table>
<thead>
<tr>
<th>Date</th>
<th>Yrs</th>
<th>Age</th>
<th>Event</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/03/1992</td>
<td>-0.41</td>
<td>-0.4</td>
<td>Ripping &amp; Ploughing</td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>1/06/1992</td>
<td>-0.16</td>
<td>-0.2</td>
<td>Spraying</td>
<td>pre plant spraying</td>
<td>120</td>
</tr>
<tr>
<td>1/06/1992</td>
<td>-0.16</td>
<td>-0.2</td>
<td>Nursery costs</td>
<td>seedling $350/1000</td>
<td>350</td>
</tr>
<tr>
<td>1/08/1992</td>
<td>0.00</td>
<td>0.0</td>
<td>Financial Base</td>
<td>Interest Rate 5.0%; Include previous</td>
<td>0</td>
</tr>
<tr>
<td>1/08/1992</td>
<td>0.00</td>
<td>0.0</td>
<td>Planting</td>
<td>SPH(1000); [Survival 100%]</td>
<td>150</td>
</tr>
<tr>
<td>3/08/1992</td>
<td>0.01</td>
<td>0.0</td>
<td>Fertilizing</td>
<td>© MARKER; [NO3(0); NH4(0); UREA(0)] L1</td>
<td>400</td>
</tr>
<tr>
<td>1/08/1999</td>
<td>7.00</td>
<td>7.0</td>
<td>Pruning</td>
<td>Lift 1; 2.5m; 267 SPH</td>
<td>600</td>
</tr>
<tr>
<td>1/08/2001</td>
<td>9.00</td>
<td>9.0</td>
<td>Pruning</td>
<td>Lift 2; 4.5m; 267 SPH</td>
<td>600</td>
</tr>
<tr>
<td>2/08/2003</td>
<td>11.00</td>
<td>11.0</td>
<td>Pruning</td>
<td>Lift 3; 6.2m; 267 SPH</td>
<td>600</td>
</tr>
<tr>
<td>1/01/2004</td>
<td>11.42</td>
<td>11.4</td>
<td>Thinning</td>
<td>© T1; Waste; Out 0; 267 SPH;</td>
<td>500</td>
</tr>
<tr>
<td>1/06/2017</td>
<td>24.83</td>
<td>24.8</td>
<td>Forest Practices Plan</td>
<td>Forest Practices Plan</td>
<td>600</td>
</tr>
<tr>
<td>1/06/2017</td>
<td>24.83</td>
<td>24.8</td>
<td>Clear felling</td>
<td>Commercial</td>
<td>0</td>
</tr>
</tbody>
</table>
**Log Grade Set**
Table 11 outlines the market log stumpages (i.e. less harvesting and cartage costs) and specifications for Cypress in New Zealand.

**Table 11 – Log Grade Set of Leyland Cypress in Wilmot**

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Length Min (m)</th>
<th>Length Max (m)</th>
<th>SED Dub Min (cm)</th>
<th>LED Dub Max (cm)</th>
<th>Value $/m³</th>
<th>Preferred Length Step (cm)</th>
<th>Overcut Length (cm)</th>
<th>Pruned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawlog Peeler</td>
<td>S</td>
<td>2.7</td>
<td>8.0</td>
<td>30.0</td>
<td>999.0</td>
<td>120.0</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knoty Sawlog/P</td>
<td>A</td>
<td>2.7</td>
<td>11.0</td>
<td>30.0</td>
<td>999.0</td>
<td>60.0</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Sawlog</td>
<td>K</td>
<td>2.7</td>
<td>11.0</td>
<td>20.0</td>
<td>999.0</td>
<td>50.0</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firewood</td>
<td>F</td>
<td>2.4</td>
<td>11.0</td>
<td>10.0</td>
<td>999.0</td>
<td>10.0</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>X</td>
<td>0.0</td>
<td>999.0</td>
<td>0.0</td>
<td>9,999.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Financial Analysis and Returns**
The stand regime operational costs (Table 10), and the current log prices (Table 11) were analysed by the Toolbox for a range of clearfell age classes, with 5% discount rate. The returns for the various clearfell ages are summarised in Table 12.

**Table 12 – Revenue, Net Present Value and Internal Rate of Return**

<table>
<thead>
<tr>
<th>Clearfell age (yrs)</th>
<th>Revenue ($/ha)</th>
<th>NPV ($/ha)</th>
<th>IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>25,883</td>
<td>6,421</td>
<td>13.00</td>
</tr>
<tr>
<td>25</td>
<td>34,931</td>
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<td>9.76</td>
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<tr>
<td>40</td>
<td>66,787</td>
<td>6,763</td>
<td>8.84</td>
</tr>
</tbody>
</table>

Based on the fixed assumptions of current market log prices, log grade and growth model volume projection, revenue increases with longer clearfell age. This is due to increased projected volumes and the higher ratio of higher value pruned log and sawlog.

**What is the ideal clearfell harvest age?**
The NPV is graphed against Clearfell age in Graph 3. The ideal harvest age is where NPV peaks, which is age 30 at $7,912/ha. The good investment return is further supported by the high IRR return of 10.85% (see Table 12). Note that this is based on the fixed assumptions mentioned above.

**Graph 3 – Net Present Value of 1992 Leyland Cypress**
Disclaimer - Application of the Farm Forestry Toolbox

The growth models used in Toolbox are developed from industrial research data which is limited in its range of age, site quality, stocking and thinning effects. All models are imperfect, and you are strongly advised to seek professional advice from Private Forests Tasmania before investing on the strength of results from this program.

Glossary

**Basal Area**
The area of the cross section of a tree which although termed “basal” is in fact calculated at breast height (1.3m above ground level).

Note: A common term is Basal area per hectare = the sum of the basal areas of the individual trees over a hectare of forest. It is often determined from a sample of trees in a plot.

**Current Annual Increment (CAI)**
The CAI is defined as the annual change in growth of a stand and is a measure of how actively the stand is growing. It is often expressed in m$^3$/ha/yr. CAI and MAI (Mean Annual Increment) are linked as the curves below show, with the optimum harvest age for the maximum rate of annual growth where the two curves intersect.

![Image of Mean Annual Increment (MAI) and Current Annual Increment (CAI) curves]

**DBHob**
The diameter of a tree measured at breast height over bark. It is the standard height in Australia at which all trees have their diameter measured and is always the diameter over bark (in centimetres) of the tree stem at 1.3m above ground on the uphill side. Loose or flaky bark should be removed prior to measurement.

**Dub**
The diameter under over bark, used in log specification (refer to Log Grades); which is specified by log buyers.

**Internal Rate of Return**
One of a number of techniques used to choose between a selection of projects. It is determined by finding the interest rate or discount rate that equates the present value of benefits with the present value of costs. The higher the indicated rate of return on the investment, the more attractive is the project as it maximises the return of monetary capital. IRR shows which project makes the highest benefit the quickest.

**Warning:** IRR can only be used when the project has all of the costs occurring before all of the revenues. If a project has some revenues occurring first then a very high and misleading IRR may be produced.
It is advisable to use IRR to supplement NPV results rather than using IRR by itself. Seek expert advice before carrying out a project using IRR as a deciding factor.

**Large End Diameter**
The bigger end of a log. This is most often the end of the log that is closest to the stump, except perhaps where it coincides with a swelling associated with a whorl of branches.

**LED**
Large end diameter of log; usually measured under bark; as specified by log buyers.

**Log grades**
When a tree is being assessed for the quality of timber it may produce, the assessor will assign particular quality grades to various parts of the tree, depending on the condition of those parts. These log or quality grades are defined by a number of criteria or requirements. For example, for a log to be classed as a particular grade it may be a necessary criterion that the log be completely free of bumps and knots. Depending on the species of tree, there are a number of different log grades.

**Mean Annual Increment (MAI)**
The MAI is defined as the annual change in growth of a stand based on the standing volume at the time of harvest divided by the age at which the harvest occurs and is a measure used to compare two regimes of different rotation lengths. It is usually expressed in $\text{m}^3/\text{ha}/\text{yr}$. MAI and CAI (Current Annual Increment) are linked as the curve below shows, with the optimum harvest age for the maximum rate of annual growth where the two curves intersect.

![Mean Annual Increment (MAI)](image)

**Mean Dominant Height (MDH)**
An important measure of forest size, which, together with age, can be used to calculate indices of site productivity. The definition of MDH varies widely. Many organisations (and the growth models they create) use the mean of the tallest 50 trees per ha, but you should use a definition that best suits you and your region (ask a forestry consultant).

**Net Present Value (NPV)**
One of a number of techniques used to choose between a selection of projects. Over the period of a forest rotation, costs and revenues often occur at different times—for example, establishment costs at the very beginning versus clearfell revenue perhaps 35 years later. As a result, it is necessary to either discount costs/revenues back to one common year or compound them forward to some common year in the future. NPV is calculated by discounting all costs and revenues over the course of the rotation to present day values and calculating the difference between these discounted revenues and costs.

\[
\text{NPV} = \text{Sum of discounted revenues} - \text{Sum of discounted costs}
\]

NPV = 0 (zero) means the discounted costs and revenues balance exactly.

NPV < 0 (negative) indicates that the discounted costs exceed the discounted revenues.
NPV > 0 (positive) indicates that the discounted revenues exceed the discounted costs and so the project looks promising. The higher a project’s NPV, the greater its $worth to us today. As it is usual to wish to maximise the return we get on our assets, the project we would choose, considering only the $value of the inputs in the calculation, would be the one offering the highest NPV. Seek expert advice before carrying out a project using NPV as a deciding factor.

**Plot**
A sample area of trees measured to get an estimate of the surrounding larger forest area.

**SED**
Small end diameter of log; usually measured under bark; as specified by log buyers.

**Stand Diameter Height (SDH)**
Standard diameter height (SDH) is the height at which tree diameter is measured in the Inventory tool. In many countries this height is at 1.3 m above the ground on the uphill side of the tree and is commonly called breast height. However, some countries have a different “standard height”—for example New Zealand uses 1.4 m.

For single-stem trees, breast height is convenient and easily measured. However, for multi-stemmed species such as mallee, breast height at 1.3 m is unsuitable and a measurement height lower down is usually used.

Where there is a bump or large branch at 1.3 m, you may have measured the diameter at a non standard height (perhaps a little lower or higher where the stem was not distorted by irregularities) and this height can be recorded along with the diameter of the tree in the Inventory tool where the tree shape model for the selected species can use this information to estimate the tree volume. You can define your own standard stand diameter height for use in the Toolbox using the Default Data Editor.

**Stump Height**
The height above ground to the bottom of the first log in a tree. You can define your own standard stump height for use in the Toolbox using the Default Data Editor.

**Total tree height**
The height in metres from ground level (including the stump height) to the uppermost green tip.
Disclaimer

The information contained in this plan is the best available to Private Forests Tasmania at the time of writing.

- This Plan has been prepared by Private Forests Tasmania to enable the landowner to establish a plantation or shelterbelt on their property.
- The regime outlined in this Stand Development Plan is not common. It has been developed based upon the best available information from other growers and researchers within Australia and New Zealand. However, there have not been sufficient numbers of stands established, managed or harvested to predict with confidence the best possible regimes. Unlike species such as *Pinus radiata*, the growing of plantation Blackwood for high quality sawn timber is a relatively recent farm forestry innovation. In order to ensure the best possible outcome, these species require detailed and timely adherence to all regime activities. Pruning and thinning, in particular, will be determined by stand characteristics and the timing of activities may vary from that outlined in this plan. Before commencing pruning and thinning operations, seek professional advice if required. Failure to complete regime activities may result in sub-optimal outcomes.
- While every effort is made, the information provided concerning Special Values for the stand may not be exhaustive. This Plan should not be used by itself to complete a Forest Practices Plan or Private Timber Reserve application without verification.
- Information in the Appendices has been compiled to assist landowners with land management activities. However, Private Forests Tasmania takes no responsibility for any information contained within these Appendices that is not directly attributed to Private Forests Tasmania.

Private Forests Tasmania takes no responsibility for the implementation of any forestry development options provided in this plan. If further information is required, the landowner should seek professional advice.

By accepting this plan the landowner acknowledges the above disclaimers.

This Development Plan has been prepared in accordance with the principles and approaches specified in the Forest Practices Code (the Code). It should be followed to ensure that natural values have been adequately considered throughout the operation and that the success of the plantation is not limited by inappropriate establishment and management methods. References are also made to Farm Forestry Information Sheets containing relevant technical and background information.

Herbicides must only be used for their approved usage on target plants. When using the chemical, safety instructions must be followed and usage must comply with the product label. Chemical use must adhere to the principles and approaches outlined in the Forest Practices Code. All ground spraying of chemicals must also comply with the Code of Practice for Ground Spraying (DPIWE Nov. 1999). Refer to Appendix 1.
### Stand Location

**Owner**
- Roger Poltock

**Name of Area**
- Blackwood Plantation

**Property Name**
- Poltock

**Address**
- 192, 201, 265 Cradle Mountain Road Wilmot 7310

**Municipality**
- Kentish

**IBRA Region**
- Woolnorth

**UPI (s)**
- 5107252, 5107324, 5101620, 5101622

**Plan No**
- NW-29

**Stand No**
- 1-3

**1:25,000 Mapsheet**
- Wilmot (4241)

**Grid reference**
- 430600, 5416000

### Area Description

**Current Land Use**
- Unproductive Agriculture

**Is the stand in a current PTR?**
- NO

**Dominant Forest Species 1**
- Non-forest

**Majority slope (%)**
- 5

**Dominant Forest Species 2**

**Maximum altitude (m)**
- 380

**Dominant Forest Species 3**

**Rainfall (mm)**
- 1250

**Understorey Type**

### Soil Description

**Geology 1**
- Tertiary Basalt

**Geology 2**

**Soil type 1**
- Gradational clay / loam

**Soil type 2**

**Erodibility soil 1**
- Low

**Erodibility soil 2**

**Fertility soil 1**
- good natural site, eg basalt

**Fertility soil 2**

**Drainage soil 1**
- moderately well drained

**Drainage soil 2**

**Stoniness soil 1**
- 10-20%

**Stoniness soil 2**

---

January 2001
Special Values

Are any of these values present on the area?

- Fauna
- Landscape Priority Zone? C
- Flora
- A • The landscape character must be fully retained
- B • The landscape character must be partially retained
- C • The landscape character may be modified
- Geomorphology
- Archaeological potential? Low
- Soil
- Cultural heritage
- Are there prescriptions for Special Values included in this plan? NO

Water Quality

Is the operation within a town water catchment? YES

Town Sheffield / Raitton
River Forth
Distance to Intake (km) 10
Water Intake Code 117
Is there a known domestic water intake within 2 km? NO

Planting

Reasons for planting

- Commercial
- Shelterbelt
- Stock shelter
- Salinity control

Other (Specify)

Area covered by this plan (ha) 1
Area to be planted (ha) 1

Species to be planted

- Acacia melanoxylon

Other species planted

Is a Development Application required? NO
Has a Development Application been completed? NO
### Non Wood Values In this Plan

<table>
<thead>
<tr>
<th>Primary non wood values</th>
<th>Improved land use within its capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary</td>
<td>Improved weed control</td>
</tr>
<tr>
<td>Secondary</td>
<td>Improved shelter</td>
</tr>
<tr>
<td>Secondary</td>
<td>Improved water quality</td>
</tr>
</tbody>
</table>

### Special Values Considerations

None

### Operational Prescription

Refer to Silvicultural Regime Activities

### Cash Labour Requirements

### Planning Officer

Stuart Swanson
SITE DESCRIPTION

1.5 ha of commercial Blackwood is to be established, with 0.5 ha planted in 2001. The remaining 1.0 ha will be planted in 2002, comprising of 3 separate planting sites.

**2001 Planting (0.5 ha)**

Drainage has been improved and the surrounding area established with Blackwood. Electric fencing is used for stock exclusion.

**Stand 1 (0.4 ha)**

Drainage between the 2 dams will be improved, fencing erected and the swampy, unproductive ground planted with Blackwood. ~180m of electric fencing is required for stock exclusion.

**Stand 2**

Stand 2 (0.3 ha) requires ~270m of electric fencing.

**Stand 3**

Stand 3 (0.3 ha) is located within a small gully. Some of this gully was planted to *Pinus radiata* in 1999. Approximately half of stand 3 will be planted between the existing *Pinus radiata* while the other half will be planted further up the gully where pasture and weed species currently exist. ~150m of electric fencing is required.

Soil is derived from Tertiary basalt, forming a stony, brown gradational clay loam that is moderately well drained. Topography of the surrounding area is undulating. The sites are relatively exposed. Stand 1 has been planted with Red Creek and Pyengana provenances.
# BLACKWOOD

*(Acacia melanoxylon: High-Value Specialty Timber)*

## SILVICULTURAL REGIME ACTIVITIES

<table>
<thead>
<tr>
<th>Year</th>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Summer</td>
<td>Order Seedlings (Blackwood &amp; shelter species)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grazing / Slashing to reduce weed volume.</td>
</tr>
<tr>
<td></td>
<td>Autumn</td>
<td>Fencing to exclude stock.</td>
</tr>
<tr>
<td></td>
<td>Winter / Spring</td>
<td>Weed Control (spot application) with knockdown herbicides.</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>Planting blackwood @ 750 stems / ha.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Browsing Control - install tree guards immediately after planting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fertilising of blackwood (2/0g / tree Superphosphate) 4 weeks after planting (successful weed control is essential)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Order seedlings <em>(Eucalyptus nitens)</em> for the following year.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weed Control (spot application)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAUTION – shields must be utilised during all weed control activities to avoid potential injury and/or death of the young trees.</td>
</tr>
<tr>
<td>1</td>
<td>Autumn</td>
<td>Weed Control (spot application) for planting of 'nurse crop'.</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>Planting of <em>(Eucalyptus nitens)</em> @ ~250 stems / ha.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weed Control (post-planting) with knockdown herbicide</td>
</tr>
<tr>
<td>1-6</td>
<td>Summer</td>
<td>Form Pruning of Blackwood.</td>
</tr>
<tr>
<td>2-4</td>
<td>Autumn</td>
<td>Weed Control (on-going)</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>Weed Control (on-going)</td>
</tr>
<tr>
<td>2-4</td>
<td>Spring</td>
<td>Thinning of Blackwood to ~500 stems / ha (remove 1 / group)</td>
</tr>
<tr>
<td>3-8</td>
<td></td>
<td>Clearwood Pruning <em>(variable lift pruning)</em></td>
</tr>
<tr>
<td>5-6</td>
<td>Spring</td>
<td>Thinning of <em>(Eucalyptus nitens)</em> to ~125 / ha (dominant trees stem injected with Roundup )</td>
</tr>
<tr>
<td>6-7</td>
<td>Spring</td>
<td>Thinning of blackwood to ~250 stems / ha.</td>
</tr>
<tr>
<td>7-8</td>
<td>Spring</td>
<td>Thinning (stem injection) of remaining <em>(Eucalyptus nitens)</em>.</td>
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<tr>
<td>39</td>
<td>As Required</td>
<td>Forest Practices Plan for commercial harvest.</td>
</tr>
<tr>
<td>40</td>
<td>Dry conditions</td>
<td>Commercial Harvest of blackwood.</td>
</tr>
</tbody>
</table>

Indicative ages for most silvicultural activities *(particularly pruning and thinning)* are estimates and must be determined by regular monitoring of tree and stand characteristics.
PLANTATION ESTABLISHMENT & MANAGEMENT

PLANTING DESIGN

The following planting design is recommended. Stocking rate for Blackwood is 750 stems / ha, with group planting such that 3 seedlings are planted / group (1.5m between trees within each group) and groups spaced 6.3m apart. The best tree from each group of 3 is selected as a final crop tree, resulting in an even distribution of crop trees and enabling relatively even crown development. This provides for a final post-thinning stocking of 250 crop trees / ha.

B  B  B  B  B  B  B
   B  B  B

N  N
B  B  B  B  B  B  B
   B  B

N  N
B - Blackwood (750 stems / ha)
N - Nurse Crop (250 stems / ha)

A nurse crop is likely to benefit the Blackwood in 2 respects:
• Provides increased shelter for the Blackwood (highly beneficial to growth).
• Provides some suppression of sidelong light such that form may be improved.

Shining Gum (*Eucalyptus nitens*) is recommended as the nurse crop, planted at 250 stems / ha. However, it should not be planted at the same time as the Blackwood. Shining Gum is very fast growing compared to Blackwood and will dominate the site within a few years. If the nurse crop is not removed, the Blackwood will be suppressed and become increasingly susceptible to pests and diseases. It is recommended that if a nurse crop is utilised then it should be planted 1-2 years after the Blackwood, allowing the Blackwood to become established. The onset of competition is delayed and allows the Blackwood to attain a greater size before removal of the nurse crop is required.
PROVENANCE SELECTION

Stand 1 has been planted with Red Creek and Pyengana provenances. Plantings for 2002 should also contain more than one provenance, as there is little evidence to suggest which provenance is superior. Collecting seed from local Blackwood trees of suitable form will provide another option in addition to the provenances supplied by commercial nurseries. Seed is likely to be suitable for collection from February through to late March when the seedpods mature.

BROWSING CONTROL

The landowner has utilised tree guards for browsing protection against rabbits and hares. Electric fencing is used to exclude stock while wildlife proof fencing and shooting has controlled wallabies.

FERTILISING

Most fertiliser trials with Blackwood suggest that they do not respond to additions of nitrogen but do have a positive response to phosphorous (P). Blackwood seedlings also require sulphur (S) in roughly the same quantity as phosphorous.
- 200 grams of superphosphate / seedling is recommended as a source of P and S. Superphosphate need not be buried but simply sprinkled around each seedling.
- Fertilising of the nurse crop (if planted) is not recommended, as this will accelerate growth of the nurse crop and the onset of earlier competition.
- Fertiliser should not be applied until adequate weed control has been achieved.

WEED CONTROL

Slashing followed by spot spraying with Roundup Biactive prior to planting is recommended. Residual herbicides are not recommended for use near watercourses.

2001 Planting

The landowner has utilised a rope wick applicator to apply Roundup in order to control weed species (post-photo). Spot spraying prior to planting would enable easier control.

Weeds within the guard must be carefully removed by hand.

The 2001 plantings will require further weed control. Spot spraying (with protective spray shield) with a radius of 1m around each seedling should be undertaken in autumn 2002. Due to the proximity of plantings to watercourses, weed control for all
2001 and 2002 plantings should be undertaken with Roundup Biactive each spring and autumn for 3-4 years. The area of spot application around each tree should increase each season (e.g.: 1.5, 2.0, 2.5, 3.0m diameter spots) as the trees and their root systems increase in size.

**PRUNING**

The landowner intends to undertake intensive form pruning in order to ensure suitable form for sawlog production. Refer to Appendix 2 for information regarding the form pruning of Blackwood. Form pruning should commence at age 1.

**Clearwood pruning** should commence once the following occurs:
- Stem diameter reaches 10cm. Clearwood pruning should continue such that all branches are removed where the stem diameter is 8-10cm.
- Branches that attain a diameter of 3cm at their base should be removed, regardless of where they occur on the stem.
- Steep angled branches that can be difficult to prune correctly should be removed as early as possible, regardless of size or position on the stem.

It is anticipated that clearwood pruning commence at age 2-3 and continue to a height as determined by each tree. Some trees may be able to be pruned to 6 or more metres while others may only produce short sawlogs of 3-4 metres.

**Pre-emptive pruning** may be undertaken from age 1-2 onwards. This involves the shortening of branches with a diameter at their base of more than 2cm. Half to two-thirds of the branch is removed, leaving some foliage such that the branch does not die. This slows branch development, delaying the necessity to completely remove the branch before it exceeds 3cm in diameter.

**THINNING**

The trees should determine the thinning regime. Each group of 3 should be thinned to 1 / group by the time a dominant, healthy tree has formed a straight stem to the desired height. For example, by age 2-3 it may become obvious that 1 tree within the group is not as vigorous as the other 2. Remove the poor quality tree and concentrate pruning on the remaining 2 trees. Retain these 2 trees for as long as is necessary to determine which is the most vigorous and of suitable form for sawlog production. This may be as late as age 6 or 7. All retained trees within each group should be pruned until such time as that the best tree can be chosen with confidence.

Thinning / removal of the nurse crop should be undertaken over 2 stages to reduce the potential for windthrow within the retained Blackwood. It is recommended that 50% of the *Eucalyptus nitens* be stem injected with Roundup at age 5-6. The remaining 50% should be removed when severe competition with the Blackwood commences, estimated to be around age 7-8. No attempt to fall the nurse crop should be made, as considerable damage to retained stems is likely to occur.
SHELTER

Blackwood thrives in locations in which it is sheltered from winds. If exposed, growth will be slowed and the ability to form a straight stem following form pruning may be severely compromised. It is highly recommended that a shelter planting be established around the edge of Stands 1-3. This shelter planting should be located on the southern and western side of each Stand and located at least 5-6 metres from the nearest Blackwood. A shelter planting closer than this will result in excessive suppression of the adjacent Blackwood.

A number of species are suitable for the provision of shelter, including *Eucalyptus nitens* (Shining Gum) and *Pinus radiata*. Approximately 250m of shelter planting is required for stands 1-3. If plated 2.5m apart 100 seedlings of the desired species will be required.

HARVEST AGE & INVENTORY

It is anticipated that Blackwood could be harvested within 35-40 years, provided:
- Good weed control has been achieved within the first few years.
- A shelter planting is incorporated into the planting design.
- The nurse crop (if utilised) is removed prior to the onset of severe competition.

Regular monitoring of height and diameter should be undertaken in order to assess growth rates. This is particularly the case if utilising a nurse crop. The onset of competition will impact upon diameter growth of the Blackwood before height growth. If plots are established and the trees measured each year, the increase in diameter from one year to the next can be recorded. When diameter growth begins to slow dramatically, the nurse crop must be removed as soon as possible.
### The Australian Master TreeGrower Inventory Spreadsheet

The Australian Master TreeGrower Inventory Spreadsheet allows farmers to plug in data from a measurement plot and calculate basic stand measurements. Simply download this file and insert your data in the white cells. NOTE: you'll need to clear the existin

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<thead>
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<td>If circular plot - radius (m)</td>
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<td>Paddock name</td>
<td>Otherwise plot - length (m)</td>
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<th>Form 1,2,3</th>
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<th>Height (m)</th>
<th>Prunod Ht (m)</th>
<th>Basal Area (m²)</th>
<th>Tree Vol. Cone (m³)</th>
<th>Tree Vol. Torp. (m³)</th>
<th>Prun. Vol. taper 1cm/m</th>
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Species: This spreadsheet can handle up to 3 tree species and provides separate results for each below.
Heights of the 3 or 4 trees with the largest diameter are measured. The program averages these to determine mean dominant height.
### Plot Report

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<th>Trees in Plot</th>
<th>Basal Area (m²)</th>
<th>Plot Volume (m³)</th>
<th>Total Volume (m³)</th>
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### Species Report

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<th>Stocking %</th>
<th>Mean DBH (cm)</th>
<th>Mean Height (m)</th>
<th>Mean F.Ht (m)</th>
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### Crop Data

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### DBH Distribution in Plot

![DBH Distribution in Plot](path/to/image)

- **Thin**: Dark red bars
- **Leave**: Yellow bars
- **Crop**: Brown bars

### Totals

<p>| | |</p>
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