



Forestry

Management of blue gum harvest residue from hardwood plantation operations

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Management of Blue Gum residue

Presentation Outline

1. Elders Forestry overview
2. Harvest residue management practices
3. Broader considerations

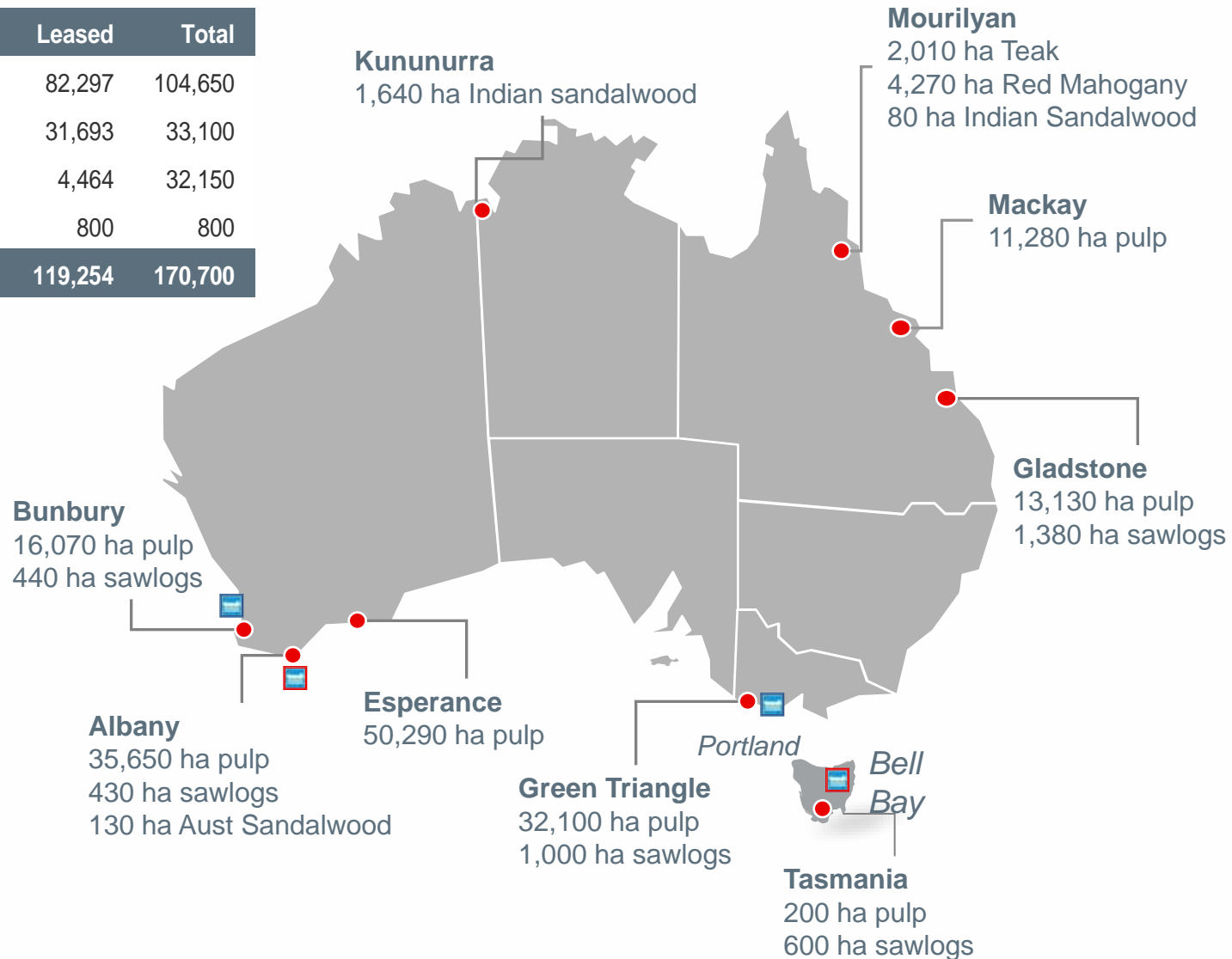


EFL Business Locations



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Area (ha)	Owned	Leased	Total
Western Australia	22,353	82,297	104,650
Green Triangle	1,407	31,693	33,100
Queensland	27,686	4,464	32,150
Tasmania	0	800	800
Total	51,446	119,254	170,700

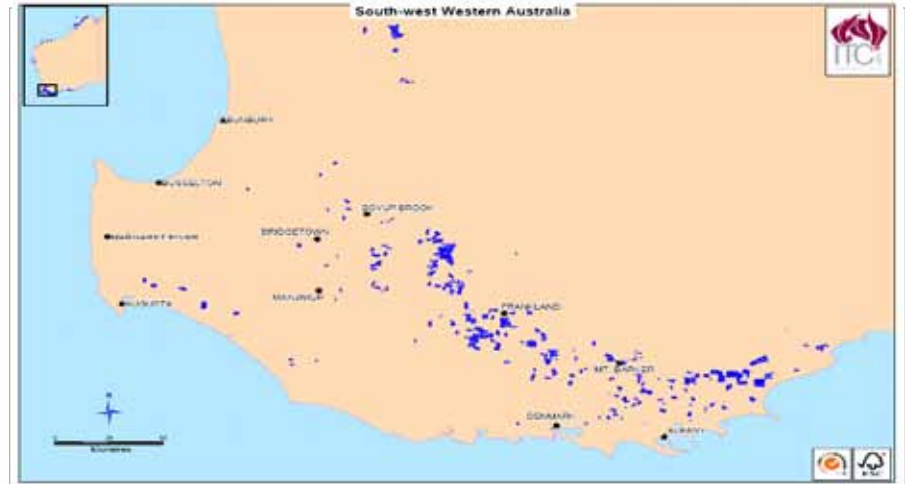


South-West Western Australia

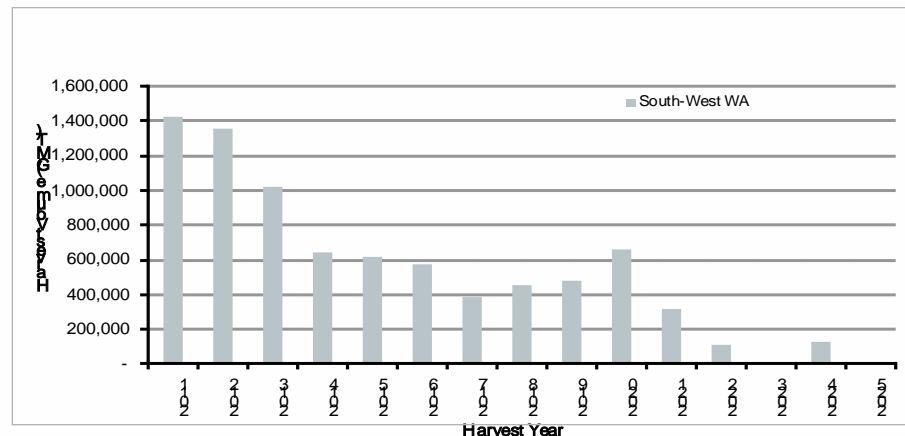
Summary

- Elders owns or manages around 49,100 ha of mainly *E. globulus* pulpwood plantations in the South-West WA region.
- Plantations in Albany W.A are located within 130 km of the Albany port, the 2011 average lead is 95km.
- The yield per hectare of current harvest ranges from 125 to 200 GMT per ha with an average of 150 GMT per ha for the 2011 harvest year.
- Woodchips are exported from ports at Bunbury and Albany, and Elders owns 100% of the Albany Chip Terminal (PPT) located at Albany.

Location Map



Harvest Volume by Destination



Elders Planted Area

Predominant Species	Freehold (ha)	Leasehold (ha)	Total (ha)
<i>E. globulus</i>	10,055	39,024	49,079

Est. % of Blue Gum harvest residue to total GMT/ha

(Source: EFL internal conversion trials, Albany W.A - 2009)



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Harvest Yield (tons/ha)	% of Biomass produced to Standing Volume	Actual tons biomass produced
100	40%	30-40 GMT
150	34%	40-50 GMT
200	30%	50-60 GMT
250	28%	60-70 GMT
300	26%	70-80 GMT

Cut to length at stump



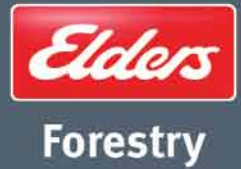
In field chipping at roadside



Harvest System Comparisons

Measure	CTL at stump	IFC at roadside
Stump heights	-1.3% recoverable volume	Benchmark
Volume Utilisation	-2.4% recoverable volume	Benchmark
In Forest Harvest costs	Benchmark	10-20% higher
Total Supply Chain Costs	1-5% higher	Benchmark
Coppice Survival Rates	>90%	80-90%

Harvest residue management practices



Harvest residue from an annual harvest program of 500k GMT at an average yield of 150 GMT/ha equates to an est. 150,000 tonnes.

Current residue management options :

- 1. Wind Rowing down inter-rows.**
- 2. Mushroom piles throughout the plantation (2R coppice).**
- 3. Post-harvest mechanized spreading.**
- 4. Stockpiling at roadside for burning.**
- 5. Sale as Bio-mass.**

Inter-row windrowing of harvest residue



Mushrooming of harvest residue



Post-harvest mechanized spreading



Post-harvest mechanized spreading



Spreading of harvest residue using rear discharge towed muck spreader

Before



After



Stockpiling harvest residue at roadside



Sale of harvest residue as Biomass



ELF sale of harvest residue as Bio-mass



- Sales to Plantation Energy Australia (PEA) commenced September 2009.
- Point of sale is *roadside* i.e. PEA is responsible for collection, processing and transportation of residue to their facility.
- Sale price is in \$A per bdmt.
- Harvest residue collection area is limited to 100km radius of PEA facility.
- Harvest residue is stockpiled along roadside to a max 50m width inside the plantation area.
- Harvest residue is presented as “contaminant free” as is possible.

- Develop a 6 monthly uplift schedule and review monthly / quarterly.
- De-phase harvest residue uplift from mainstream harvesting operations .
- Educate harvesting crews to minimise contamination of residue.
- Ensure the Purchaser's Contractors fully comply with OSH & E legislation and industry standards, etc .
- Have a plan to manage uncollected residue (can be 25% of presented material).
- Formally agree commercial terms e.g. :
 - *Specifications, Payment terms, Supply of information e.g. docket data, Insurance & indemnities, Force majeure, etc*

Management of contamination levels - a process of “crew education and buy-in”

Before



After



Management of site “post uplift” of harvest residue

Before



After — residue spread with loader



Considerations in determining management options for post harvest residue

- What is the future use of plantation, i.e. 2R or alternative land use e.g. grazing or horticulture?
- If alternative land use, is burning an acceptable option?
- Is the plantation in economical haulage range of a biomass processor?
- If 2R – will the second crop be coppice or new seedling establishment?
- Will removal of the residue significantly impact site productivity?

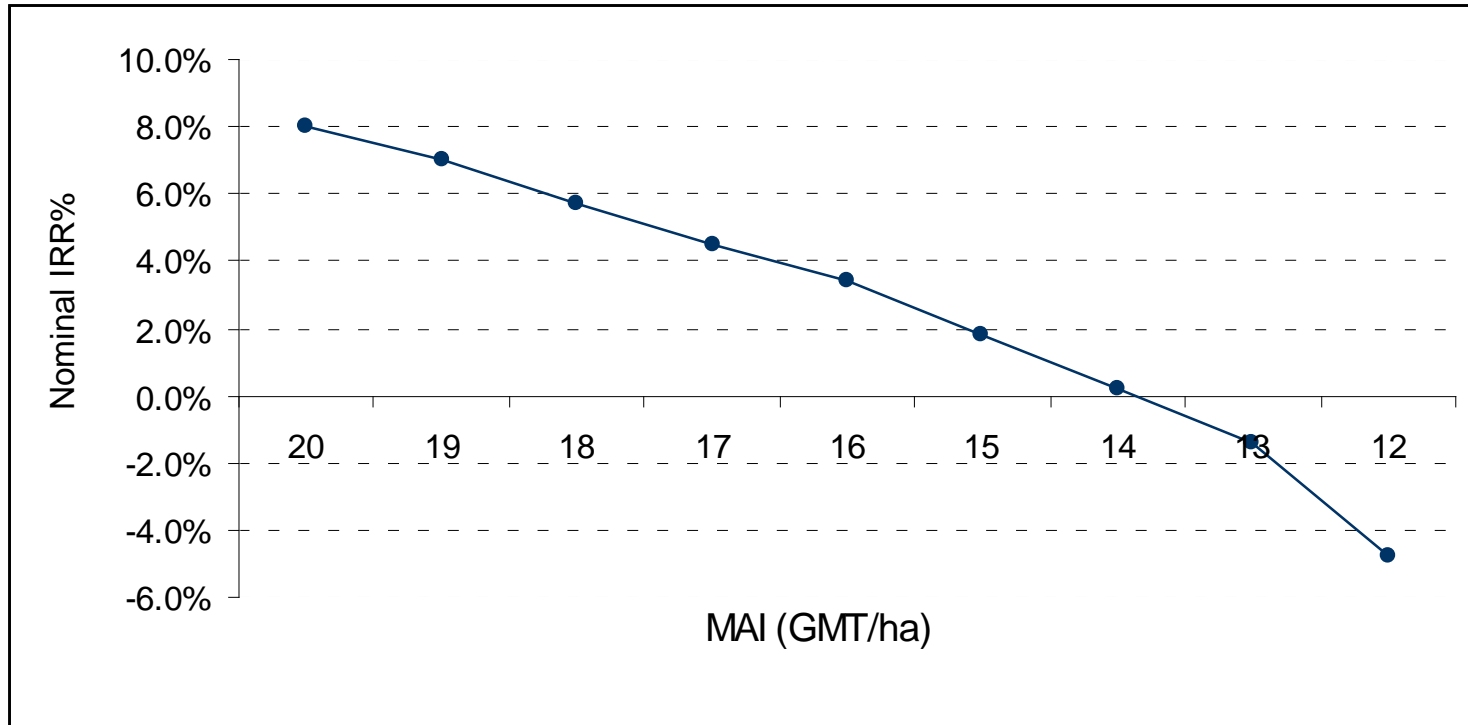
Estimated nutrients in blue gum residue and replacement costs – total nitrogen in residue may account for up to 30% of the total nitrogen pool.



Nutrient Element	Residue Nutrient content (kg/ha)	Fertiliser required	Price per ton	Price per hectare
Nitrogen	350-500	900kg urea (45% N)	\$ 600	\$540
Phosphorous	20-35	300kg super (15% P)	\$ 400	\$ 133
Potassium	140-250	1350kg potash	\$ 500	\$ 675

Source: Nambiar S, Sustainability of Eucalyptus plantations is Failing, Australian Forestry journal Vol.73 No. 4, 2010.

Loss in site productivity on project IRR%



Project Parameters:

Coppice / 10 yr rotation / land rent \$330/ha / 780 mm annual rainfall / 80km to port / current FOB price for E glob.

- Blue gum harvest residue accounts for 25% to 40% of standing tree volume and may contain up to 30% of the total nitrogen pool within a plantation.
- A number of residue management options are available to FME's, including sale for bio-fuel production.
- If 2R is intended careful consideration must be given to the effect of residue removal on future site productivity.
- The overarching objective of the FME is to create a sustainable an efficient plantation business.



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Thank you

