

Situation Analysis - Final

Softwood plantings on private land in the south west of WA

**Presented by:
D.G. Burnside & Associates
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1 Introduction

1.1 The purpose of the Situation Analysis

This Situation Analysis is intended to provide the context for the South West Timber Hub's Engagement Strategy that in turn is aimed at significantly increasing the adoption of farm forestry in the south west of WA, in particular the planting of radiata and maritime pines.

Prior to the development of the Engagement Strategy, it is important that the history and current status of, and realistic prospects for future farm forestry are sufficiently well documented and understood by Don Burnside and Jennifer Duffecy. Therefore a Draft of the Situation Analysis was reviewed by the Steering Committee for the Project, prior to delivering this Final Version.

1.2 Methodology

1.2.1 The point of departure for the Draft Situation Analysis.

We have deliberately prepared this Analysis using the private and corporate land holders (farmers) as being central to an understanding of the relative interest and take-up of farm forestry over the last two decades. Thus, the point of departure for the analysis is focused on how farmers are likely to view their operating environment and prospects as 'enlightened self-interested decision makers', with little or no attention given to the needs of industry for an increased flow of timber from farm forestry. Instead, the need for this increased production is taken as a given.

Hence, the analysis devotes space to the status and performance of the major competing land use in the south west, being broad acre agriculture in its diverse forms. We could also have reviewed the vast literature on adoption of new practices and enterprises in agriculture, but rather than report on that here, we will delve into that in the design of the Engagement Strategy.

1.2.2 Literature reviewed

The authors have reviewed the available secondary data in preparing the Draft Situation Analysis. As well as the documents referred to in the project brief (FPC's *Softwood Industry Strategy for Western Australia*, Indufor's *Growing the Software Estate*, FIFWA's *WA Plantations: the missing piece of the Puzzle* and the Commonwealth's *Growing our Future Policy*), we have searched the literature for other relevant documents specifically related to the structure and performance of agriculture, and the operation of the carbon market.

We have also reviewed several of the many strategies, plans, programs and mechanisms that have been put designed, and implemented (but not always) in many jurisdictions to encourage the adoption of farm forestry by farmers.

The findings from the review highlight the opportunities and the challenges that need to be addressed in achieving SWTH's objectives in expanding farm forestry. The situation analysis also provide pointers towards the particular questions that need to be addressed in the consultation to follow.

2 The current forestry estate

2.1 Total farm forestry plantings

Although there are an estimated 60,000 ha of plantations under farm forestry (i.e. plantings on private farmland) in Western Australia, with most plantings having been pines and bluegums for pulp production with substantial areas of oil mallees and sandalwood (Indufor 2017).

Most of the plantations have been established through government and private investment in share-farming or land lease arrangements. (DPIRD 2016). Of this area, an estimated 28,000 ha have been established under share-farming arrangements with the Forest Products Commission (FPC) as shown in Table 1.

Table 1: Tree plantations in the south west

Existing and proposed tenure as at June 2017	Plantation areas (ha)		
	State	Sharefarm	Dept of Water
State forests and timber reserves	35,290		
Conservation reserves and freehold land held by DBCA	12,930	40	
Other freehold	3,010	27,710	5,630
Total	51,230	27,750	5,630

Source: DBCA: Defined Forest and Plantation Areas in the south west

2.2 Pine plantations in WA

In 2016, according to the FPC, there were 97,000 ha of pine plantations in WA, with 81,000 ha being radiata pine (*Pinus radiata*) and a lesser area of maritime pine (Indufor (2017). FPC manages pine plantations of radiata pine (*Pinus radiata*) and maritime pine (*Pinus pinaster*) on state-owned and managed land and tree farms on leased farmland.

The primary commercial products are pine sawlog and pine industrial wood logs. The plantations provide the resource for three main processing plants – Wespine’s sawmill at Dardanup, Wesbeam’s laminated veneer lumber (LVL) just north of Perth and particleboard production at the Laminex site at Dardanup. The supply of pine resource to all three major processing plants is under State Agreement Acts with terms of 25 years (FPC 2019).

The Forest Products Commission’s Annual Report 2018-19 states that 4,807 ha of softwoods were harvested (yielding 879,505 tonnes of log products) in 2018-19 from a total softwood estate of 74,418 ha at year’s end (FPC 2019).

2.2.1 Share farming arrangements

According to Indufor (2017) and as shown in Table 1, there are 28,000 ha of softwoods growing on private landholdings under share-farming agreements with FPC, where the risk is shared between landholder and FPC. Indufor notes that the performance of these plantations has been mixed which is influencing landholder behaviour. In their report, they state:

The results of these share-farm arrangements have been varied, with some of these producing a viable tree crop and the landholder receiving an appropriate return for the use of the land.

However, some agreements have resulted in plantations with little realisable value as well as impacting on land uses options for the land owners. This legacy influences current stakeholder perspectives on share-farm models (Indufor 2017, p.4).

Advice from FPC is that the Commission is reluctant to expand share farming arrangements over small plantings given that there are significant transaction costs involved in having a large number of individual agreements, and given occasional disputation with landholders over pricing arrangements (see *West Australian* July 13, 2020, p. 22).

2.2.2 'True' farm forestry

True farm forestry is defined by others and in this report as being where a landholder makes a decision to grow commercial trees on their own land (or on land they have access to) and where they incur all costs and benefits from planting through to harvesting at the end of a 30 year rotation. This aligns with the Australian Government definition which has defined it as essentially the incorporation of commercial tree growing into farming systems.

It is estimated that farm forestry will return about 3.5 per cent on investment, based on planting costs of \$2,000 per ha and a net present value (NPV) of \$4,000 per ha for the timber after 30 years. Careful investment in selling the carbon captured by the plantings will deliver an additional 1.5 per cent return (FPC pers comm.)

Of the total pine plantation estate, only 3,000 ha is solely in private hands and being grown on privately held land. A map of the Defined Forest and Plantation Areas in the south west of WA (Figure 1), shows that nearly all of the private pine plantings are immediately adjacent to state pine plantations, presumably to enable economies of scale in management and harvesting.

2.2.3 Expanding the pine plantation area

As explained by Indufor (2017), at the time of publication of that report, the rate of new pine plantings has fallen to very low levels across Australia, with an estimated 1,000 ha being planted annually. In WA, over recent years, the area of state-owned plantations has been eroded by excisions for roads, mineral extraction, and water reserves (the Gngara Mound). Further, many of the older softwood share farm plantings are single rotation contracts, and are now mature and will soon be clear-felled.

In WA, to replace these losses, FPC is encouraging additional plantings through a range of means, including land purchase and planting into their own estate, some new large scale share farming arrangements with industry and through the Farm Forest Assist program.

FPC's Annual Report 2018-19 states that the Commission invested \$10 million in expanding the softwood estate. In terms of efforts to expand the pine plantation estate, FPC's Annual Report states:

Expanding the softwood estate and salvaging fire-damaged resource to ensure supply for industry has remained a focus this year. In 2018-2019, we achieved the acquisition of 520 hectares of plantable land for softwood plantation expansion. There were difficulties obtaining new land, with competing need for land from both the timber and agricultural industries. We also continued to work with industry to encourage broader investment in expanding the softwood estate.

Interest was strong in our Farm Forestry Assist grants program, which aims to encourage private investment in Western Australia's softwood estate. We negotiated agreements with five landowners, representing 180 hectares of new plantation in the South West, which we expect will be established in winter 2019. (FPC 2019, p. 24).

In terms of direct public investment, suitable cleared land in the south west costs between \$3,000 and \$14,000 per ha, with a median price for larger holdings of about \$6,000 per ha. Planting costs are \$2,000 per hectare, resulting in a total cost for establishment to government of \$8,000 per ha. To achieve the desired 50,000 ha would cost \$400 million 'up front' which is apparently not seen as an attractive investment by government.

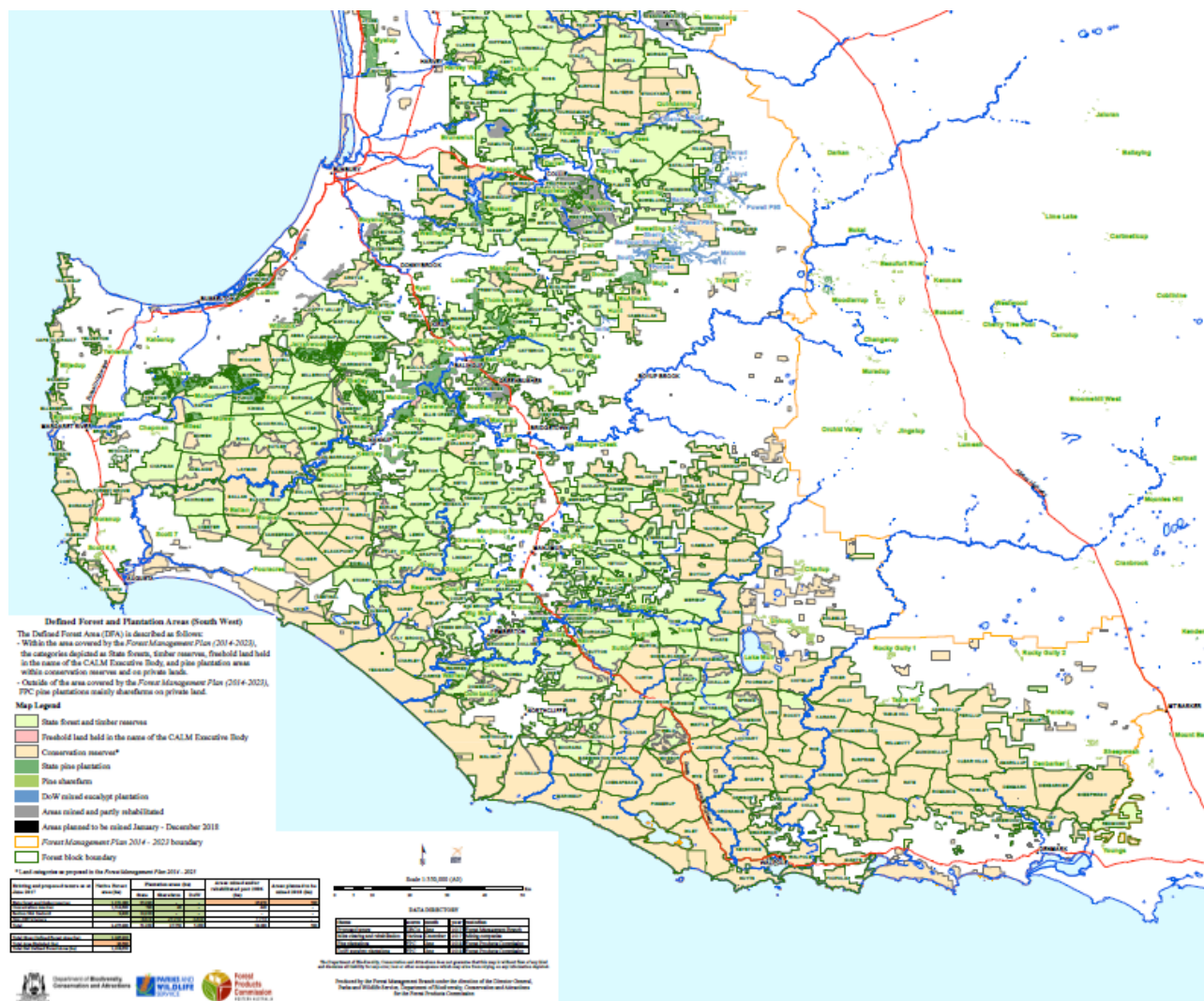


Figure 1: Defined Forest and Plantation areas in the south west

2.3 Promoting farm forestry – current mechanisms

2.3.1 Forest Products Commission

Farm Forestry Assist is a grant provided by the WA Government for private land owners to plant radiata or maritime pine trees on their land in 2020. The grant is available to

landowners who are interested in establishing new pine plantations to support the State's vibrant softwood industry. Successful grant recipients receive free, high-quality radiata or pinaster pine seedlings from the Forest Products Commission's (FPC) nursery in Manjimup. The annual amount of investment by the Government in this program is \$100,000.

In 2018-19, \$103,000 contributed to the allocation of sufficient seedlings for an estimated 180 ha of pines planted as farm forestry plantings. In 2019-2020, \$30,524 has been granted which will be sufficient for about 50 ha of farm forestry pines to be established.

2.3.2 The South West Agroforestry Network (SWAN)

The South West Agroforestry Network (SWAN) is a branch of the national organisation, the Australian Forest Growers, which represents private tree and forest growers across the country.

The South West Agroforestry Network covers the greater South West of Western Australia; i.e. the Wheatbelt, South Coast and South West regions. SWAN is managed through a committee structure with a President and support from an Executive Officer (part-time, paid position). The group supports members, tree farmers and farmers interested in tree farming through a range of means, in particular operating a Peer Group Mentoring Program built on the sound tradition that farmers learn from other farmers. The idea involves training, then supporting landholders to talk to other landholders about their tree growing and farm management plans. (Indufor 2017 and <https://www.swagroforestrynetwork.com.au/#>).

Despite this promising profile, Indufor (2017) estimates that SWAN has encouraged just 500 ha of plantings on private land on recent years, and most of this has been hardwoods. Further, advice from some quarters is that SWAN is not regarded as a credible contributor to the wider forestry industry and may currently be in abeyance.

2.3.3 Plantations and carbon sequestration

A search of the Emissions Reduction Fund Register, revealed that at 5 July 2020, there are 23 projects across Australia registered under the Plantation Forestry Methodology (Table 2). This represents 2.3 per cent of all the projects that are shown in the Register. In nearly all cases involving hardwoods or softwoods, the methodology involved the conversion of short rotation management to long rotations.

Table 2: ERF Projects established through the Plantation Methodology

Jurisdiction	Number of ERF projects established through the Plantation Methodology
Aust Capital Territory	1
New South Wales	3
Northern Territory	0
Queensland	2
South Australia	1
Tasmania	4
Victoria	5
Western Australia	7
Total	23

Of the 23 registered projects, seven are in Western Australia. Of these, two are sandalwood (*Santalum spicatum*) projects in the wheatbelt, and one each have been registered by Harvey Pine, Forest Products Commission (FPC), Newmont Gold, Synergy and Wespine.

A reason for the low take-up of projects negotiated through the ERF is said to be the low price of Australian Carbon Credit Units (ACCUs, being equivalent to one tonne of CO₂^e). As shown in Table 3, the prices per ACCU over the last several auctions have ranged between \$10.23 per ACCU in April 2016, to \$16.14 in March 2020, with a gradual increase in price since April 2016.

Table 3: Price of ACCUs at auction run by the Clean Energy Regulator

Auction date	Price per ACCU
March 2020	\$16.14
July 2019	\$14.17
Dec 2018	\$13.87
June 2018	\$13.52
Dec 2017	\$13.08
April 2017	\$11.82
Nov 2016	\$10.69
April 2016	\$10.23
Nov 2015	\$12.25
April 2015	\$13.95

Source: <http://www.cleanenergyregulator.gov.au/ERF/Auctions-results/>

These prices per tonne of CO₂^e compare poorly with \$47.00 in the EU, \$20.49 in China, \$31.07 in New Zealand and \$33.56 in South Korea (*The Australian* 15 July 2020, pages 13 and 20). Major Australian-based emitters (e.g. Qantas) are understood to be investing in these higher priced markets with Australia and internationally.

2.4 Summary

Despite the several strategies, programs and projects put designed to encourage private farm forestry in WA and elsewhere, it is clear that they have not delivered significant new plantings of pines. Indufor (2017) concluded that the imbalance between expected return and risk of an investment, that are impacting on landowner land use decisions.

Overall there has been no new softwood plantings over the past 8-9 years, and some areas of mature softwood plantations on private land have been clear-felled, with no subsequent replanting. Industry information and stakeholder input to this project indicates the decline in softwood plantation areas is continuing. FIFWA's current policy position on plantation development in WA states a combination of factors including drought, fire, the Government's decision not to replant the Gnangara plantation north of Perth and a consolidation of share-farm plantations could reduce the softwood estate to less than 40 000 ha by 2025.' (Indufor 2017 p. 4).

However, in reviewing the farm forestry literature, the point of departure for most of the discussion proceeds from the needs of the industry and not from the point of view of the landholders in the south west. Available data on the structure and performance of the agricultural land uses in the south west is reviewed in the next section.

3 Other land uses -structure and performance

3.1 Agriculture in the south west

Farm forestry needs to be able to compete with established agricultural uses on cleared land in the south west, namely sheep grazing (and some grain growing), dairy farming, beef cattle grazing and to a lesser extent horticulture (because of the smaller higher priced landholdings). Obtaining estimates of the specific financial performance of broadacre agriculture in the south west is difficult. The information presented in the following section and in the tables is taken from a range of sources.

3.1.1 Land use, farm numbers and land values

Land use in the south west

Figure 2 shows land use in the 'Bunbury region' as defined by the Australian Department of Agriculture. Within this area, there are 7,100 km² of agricultural land, which in 2018-19 generated agricultural produce with a gross value of \$852 million.

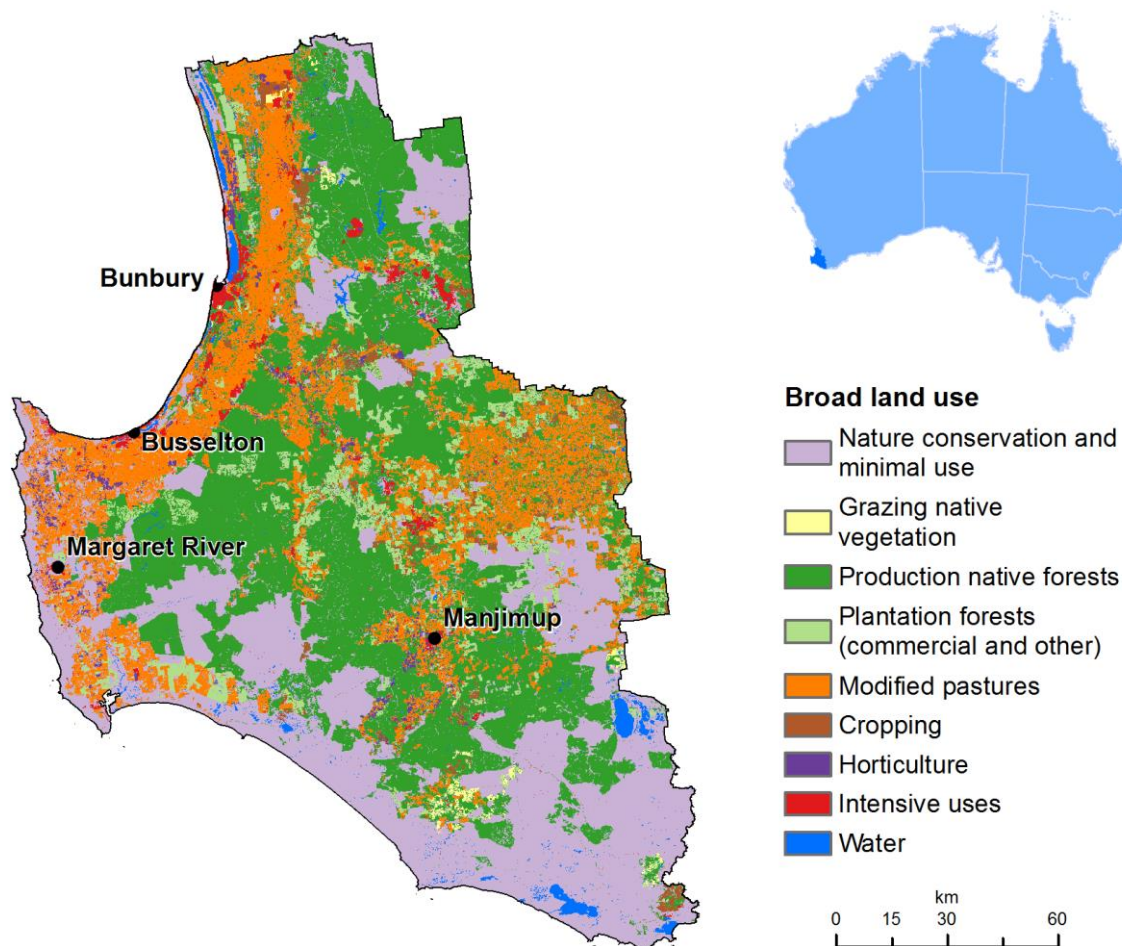


Figure 2: Land use in the 'Bunbury Region'

<https://www.agriculture.gov.au/abares/research-topics/aboutmyregion/wa-bunbury#regional-overview>

Table 4 shows that of the broad acre land uses that could be more easily converted to tree farming, beef, dairy and sheep farming, and mixed grain and livestock farming occur on 54 per cent of the agricultural area, on 624 farms.

Table 4: Agricultural industries and land use – Bunbury region

Industry classification	Bunbury region	
	Number of farms	% of Region
Beef Cattle Farming (Specialised)	372	32.4
Grape Growing	138	12.0
Dairy Cattle Farming	114	9.9
Vegetable Growing (Outdoors)	99	8.6
Sheep Farming (Specialised)	78	6.8
Grain-Sheep or Grain-Beef Cattle Farming	60	5.2
Apple and Pear Growing	47	4.0
Other Fruit and Tree Nut Growing	44	3.8
Sheep-Beef Cattle Farming	42	3.7
Horse Farming	29	2.6
Stone Fruit Growing	20	1.7
Other Crop Growing	19	1.7
Beef Cattle Feedlots (Specialised)	17	1.5
Citrus Fruit Growing	12	1.1
Other	58	5.1
Total agriculture	1,150	100

Note: Estimated value of agricultural operations \$40,000 or more. Industries that constitute less than 1 per cent of the region's industry are not shown

Source: Australian Bureau of Statistics 2019

Land degradation and capability in the south west

In 2008, the Department of Agriculture and Food (DAFWA) published an assessment of the capability of the existing agricultural land in the whole agricultural area south west of a line between Kalbarri and Esperance (see van Gool 2008). The capability assessment pulled together spatial data bases for 10 land qualities, including flood risk, land instability, site drainage, unrestricted rooting depth and salinity. Based on the mixture of desirable/ undesirable levels in these qualities at spatial scale, assessments were made of the capability – on a scale of class 1 (most suited) to class 5 (less suited) of each parcel of land for cropping, grazing and annual and perennial horticulture.

Perennial horticulture – the establishment of tree crops, some of which are long-lived – can be considered a surrogate for the establishment and management of plantation forestry. In particular, tree crops (and pines) require soils that are at least one metre deep. The characteristics of the five capability classes for perennial horticulture are shown in Table 5. Given that pine plantations require deep soils (2.5 m) and ready access to heavy machinery for thinning and harvesting, it is likely that only land in Classes 1, 2 and 3 will be suitable for pine plantations.

Table 5: Land capability classes for perennial horticulture

Capability class	General description
1 Very high	Very few physical limitations present and easily overcome. Risk of land degradation is negligible ⁸ .
2 High	Minor physical limitations affecting either productive land use and/or risk of degradation. Limitations overcome by careful planning.
3 Fair	Moderate physical limitations significantly affecting productive land use and/or risk of degradation. Careful planning and conservation measures required ⁹ .
4 Low	High degree of physical limitation not easily overcome by standard development techniques and/or resulting in high risk of degradation. Extensive conservation measures and careful ongoing management required.
5 Very low	Severe limitations. Use is usually prohibitive in terms of development costs or the associated risk of degradation.

In Table 6, the assessments of the land that is capable for supporting perennial horticulture, and hence according to the earlier assumption will be suited to pine plantations are shown for the local government authorities (LGAs) in the south west. Following from previous comments, only the areas, shown as being in Classes 1, 2 and 3 are considered capable, being a total of 649,985 ha.

Table 6: Perennial horticulture capability as total hectares per shire

Local Government Authority (LGA)	Classes 1 & 2	Class 3	Classes 4 & 5	Total
Augusta-Margaret River (S)	26,409	7,964	28,985	63,358
Boddington (S)	30,181	15,837	13,867	59,885
Boyup Brook (S)	90,439	35,156	54,064	179,659
Bridgetown-Greenbushes (S)	23,871	8,856	19,342	52,069
Busselton (S)	24,030	9,581	41,413	75,024
Capel (S)	4,528	7,057	17,448	29,033
Collie (S)	7,046	2,378	3,901	13,325
Dardanup (S)	5,911	3,898	10,247	20,056
Denmark (S)	16,154	7,422	16,021	39,597
Donnybrook-Balingup (S)	27,842	8,593	24,340	60,775
Harvey (S)	13,199	10,937	23,583	47,719
Manjimup (S)	40,923	10,806	19,177	70,906
Murray (S)	6,044	15,248	39,368	60,660
Nannup (S)	9,489	6,418	19,617	35,524
Serpentine-Jarrahdale (S)	4,431	9,035	18,914	32,380
Waroona (S)	2,781	5,245	18,586	26,612
West Arthur (S)	89,838	62,438	66,870	219,146
Total	423,116	226,869	435,743	1,085,728

Source: van Gool *et al.* (2008)

Of the LGAs shown, all except West Arthur are fully, or nearly fully within the area where annual rainfall (1910-1999) exceeds 700 mm. However, only about 50 per cent of West Arthur is in this higher rainfall area, and this area (roughly 75,000 ha) has been taken off

the total area of the Classes 1, 2 and 3 land, which reduces the total capable area to 575,000 ha.

This assessment of course does not suggest this cleared land is currently idle. It will be supporting the range of uses shown in Table 4, according to owner preference and other factors such as access to water, land parcel size and access to markets etc. However, the total area of 575,000 ha suggests an upper limit to the land area that could feasibly support farm forestry. This area limitation is considered again in Sections 4.5.2 and 4.9.

Land transfers in the south west – trends and current values

In Table 7, current land values and trends over the last 10 years are shown. Land values have steadily declined since the median land value peaked at over \$12,000 per hectare in 2012. As expected, the land value for smaller areas transacted is higher than for the larger holdings. The number of transactions in reasonably sized parcels of land (over 120 ha) in 2019 was modest at just 40 across the region.

Table 7: Agricultural land values in the south west

Parcel size (ha)	Median \$/ha				No. of transactions	
	2019	% change	10yr CAGR*	Decile	2019	YoY** +/-
50–80	\$9,387	-15.3%	-3.4%	4.8	55	-3
80–120	\$9,474	-0.4%	-1.5%	8.3	20	3
120–160	\$5,809	-5.4%	-5.9%	5.2	8	-5
160+	\$5,581	16.6%	-7.0%	4.3	32	17
Overall	\$8,161	-7.0%	-4.1%	4.8	115	12

* 10 year compound annual growth rate ** year on year

Source: Rural Bank (2020).

The number and value of land transactions in south west LGAs is shown in Table 8.

Table 8: Land sales and values in south west LGAs

LGA*	Value/ha	Historical trends in land values			Number of transactions	
	2019	5yr CAGR	10 yr CAGR	20 yr CAGR	2019	YoY +/-
Boddington	\$4,196	-3.9%	-0.5%	4.0%	9	5
Bridgetown-Greenbushes	\$6,210	5.6%	1.5%	3.0%	17	10
Busselton	\$12,706	4.5%	-0.2%	5.1%	10	5
Capel	\$10,032	0.0%	-7.1%	3.8%	6	0
Denmark	\$9,827	1.2%	1.7%	3.8%	9	-6
Donnybrook-Balingup	\$8,455	1.0%	-4.0%	2.4%	19	9
Harvey	\$10,131	-1.4%	-3.6%	4.2%	11	-1
Manjimup	\$5,932	-5.9%	-7.0%	2.3%	17	3
Murray	\$9,520	-4.0%	-6.4%	3.5%	6	-2
Waroona	\$9,535	-9.2%	-8.4%	3.9%	6	1
South West	\$8,161	-1.3%	-4.1%	3.2%	115	12

* unfortunately data were not available for all LGAs in the south west

These data show considerable variation between LGAs and between years in how land values have changed. Although land values have increased over the last 20 years – albeit by varying percentages – the trends over the last five and 10 years varies significantly between LGAs, including between neighbouring LGAs (cf. Bridgetown-Greenbushes vs Manjimup). There is now information readily available to account for these varying trends.

In 2019, the south west saw an increase in the amount of transactions greater than 160 ha, resulting in larger parcels accounting for a greater percentage of transactions. In 2019, the 50–120 ha portion of the market accounted for 65 per cent, down from 73 per cent in the previous year. A distinct reduction in the portion of transactions for higher valued, smaller parcel sizes, which was met with an increase in the amount of lower valued, larger parcels was a key driver in the lower median price per hectare for the south west region in 2019.

3.1.2 The financial returns from agriculture in the south west

The Department of Agriculture and Food (2018) reported that the financial returns (EBIT) achieved by best practice agricultural business in the grain-sheep area are between 11–14 per cent, including capital gain on farmland in ‘real’ terms. This is higher than the returns in investment (ROI) reported by Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) as shown in Table 9, although as shown in the returns in 2018-2019, there is a wide range of performance around the mean. As shown in Figure 3, the cash income for sheep farms in Western Australia has been climbing steadily since a trough in 2012-2013.

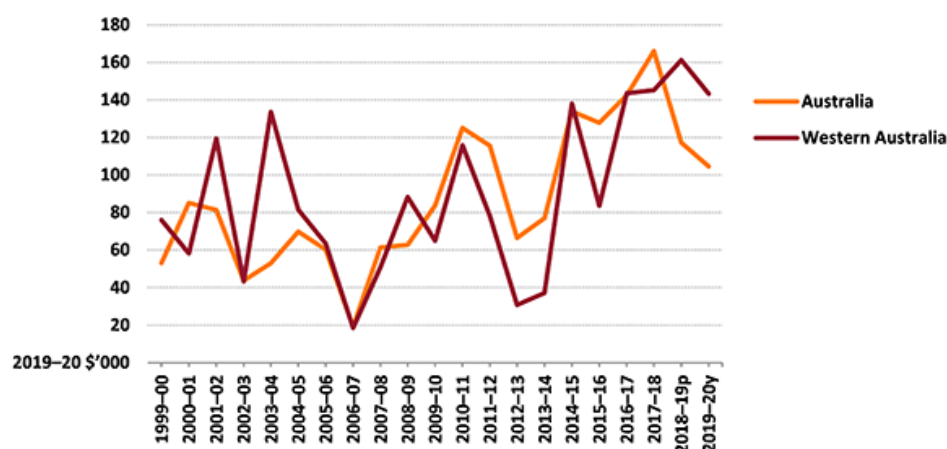


Figure 3: Farm cash income, sheep industry, 1999–2000 to 2019–20

ABARES also reported the ROI for dairy farms in WA (see Table 9), being on average around 2.0 per cent. However, in the Dairy Farm Monitoring Project managed by Dairy Australia (through Western Dairy) returns for over 24 participating farm businesses ranged from 6.7 to 4.3 per cent over the years 2014-15 to 2017-2018. Further, the top 25 per cent of participating farms had an average ROI of 8.2 per cent (Dairy Australia 2018).

Table 9: Rates of return in investment, WA farms

Measure	Return on investment		
	2017-2018	2018-2019	2019-2020*
Broadacre farms**			
Excluding capital appreciation	5.1	6.0 (+/- 0.5)	2.9
Including capital appreciation	7.3	8.5 (+/- 0.8)	na
Dairy farms**			
Excluding capital appreciation	2.7	2.0	1.5
Including capital appreciation	3.1	1.4	na

* preliminary data

*** <https://www.agriculture.gov.au/abares/research-topics/aboutmyregion/farm-fin>

Source: Australian Bureau of Statistics 2019

[nBunancial-performance-wa#performance-of-beef-industry-farms](https://www.agriculture.gov.au/abares/research-topics/surveys/farm-performance#performance-by-state-and-region)
 **<https://www.agriculture.gov.au/abares/research-topics/surveys/farm-performance#performance-by-state-and-region>

Although comparative data on the ROI for beef farms could not be found, the recent trends in average farm cash income for beef farms in Western Australia show increased returns after 2013-2014 (Figure 4).

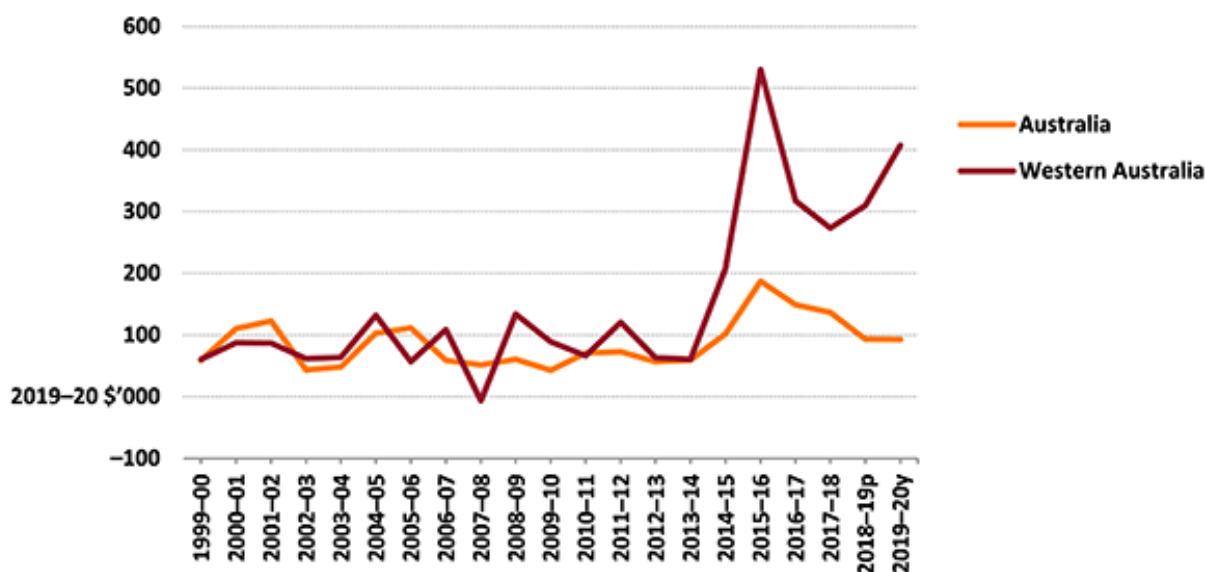


Figure 4: Farm cash income, beef industry, 1999–2000 to 2019–20

Source: ABARES Australian Agricultural and Grazing Industries Survey

3.1.3 The impact of farm and business size on productivity and performance

ABARES reported data on how the returns on investment varied according to property (and business size) as shown in Table 10. Although these data cover the whole of Australia, it is likely that the situation in WA will be very similar. The table shows that the smaller properties generated only a minor proportion of production and had a lower rate

of return on investment, compared to the larger properties where economies of scale based on a larger proportion of the production generates a higher return on investment.

Table 10: Performance of beef and sheep farms, 2016–17 to 2018–19

Size Decile	Beef farms – Southern Australia 2016-17 to 2018-19			Sheep farms 2016-17 to 2018-19		
	Output share (%)	Rate of return (%)	Equity ratio (%)	Output share (%)	Rate of return (%)	Equity ratio (%)
1	1.9	-1.7	98.6	1.3	-11.2	88.2
2	2.2	-4.0	99.7	2.3	2.3	96.3
3	2.5	-1.4	99.4	3.2	-1.1	92.9
4	3.3	1.6	97.9	4.9	2.6	90.8
5	4.3	0.9	97.6	6.4	9.4	94.6
6	5.2	0.6	96.8	6.8	3.3	94.4
7	6.8	0.7	98.1	9.8	7.0	93.4
8	10.8	3.8	95.8	11.2	2.9	91.4
9	15.3	1.6	93.2	17.4	5.8	92.9
10	47.7	4.5	88.5	36.7	8.7	88.3

<https://www.agriculture.gov.au/abares/research-topics/surveys/disaggregating-farm-size#statistical-tables>

Data for the Bunbury region shows a similar pattern where the smaller farms, although numerous in number produce a very minor proportion of the agricultural production from the region. Properties generating over \$1 million in gross returns contribute over 50 per cent of the region's total agricultural output, as shown in Figure 5.

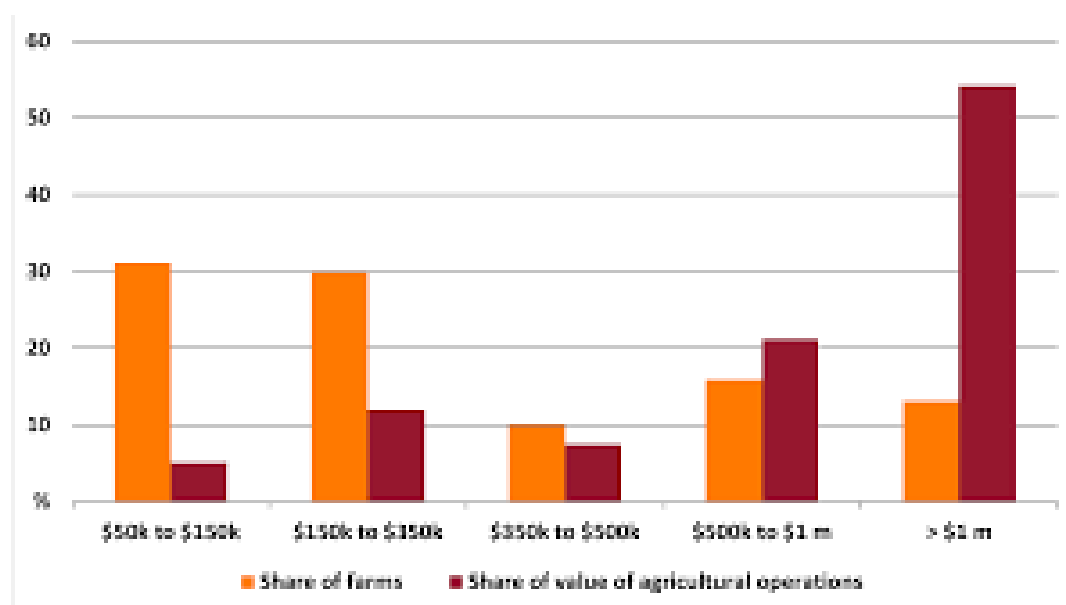


Figure 5: Distribution of agricultural production across farm size in the Bunbury Region

Source: Australian Bureau of Statistics 2019

3.2 Summary

An assessment of land capability for perennial crops (including trees for timber) suggest an upper limit for the land that could feasibly support farm forestry. Not surprisingly the value of agricultural land in the south west varies according to its current and prospective use and the size of the land parcels being traded. Although very long-term trends show increased value, more recent trends in price per ha are more variable between years and LGAs.

Current agricultural land use in the south west is diverse, with many different enterprises, a large number of individual holdings, and varying levels of profitability. On average it is clear that the major broad acre enterprises, being beef cattle, dairy, sheep grazing and mixed grazing are doing reasonably well and deliver ROIs commonly seen. Further, the larger properties and the better managers are delivering ROIs well above average and in common with most agricultural industries are delivering most of the production.

Conversely, the many small properties deliver a small percentage of regional production and often operate at a loss. As such farm forestry may be an attractive alternative land use for these properties, although the areas available will be constrained and it is unlikely that the landholders would have the capital available to invest.

At the other end of the scale of property size, these large profitable businesses generating higher returns on investment have the land available for farm forestry. However, the relatively low returns from tree farming may not make that land use attractive in economic terms alone, even considering income from carbon farming.

4 Past experience and future prospects

4.1 Past experience

The experience is that the recent (40 year) history of forestry on private landholdings in the south west is complex. Land resumption for tree plantings in the Collie River Catchment commenced in the 1980s with the aim of improving water quality in the Wellington Reservoir, which remains a work in progress.

While there was rapid take-up of opportunities to 'host' bluegum plantings in the 1990s and early 2000s, the failure of some of these plantings and the collapse of the companies managing them influenced further developments.

There was resistance to tree planting elsewhere in the Collie River Catchment and in the Tone-Warren River catchment in the early 2000s, and it is likely this situation is unchanged, particularly amongst well-established broadacre sheep farmers who as shown in the previous section are doing well.

Although these plantings were for hardwoods, it is likely that the views formed by landholders will be similar in respect of softwood trees, although the opportunity exists to differentiate between timber types.

4.2 Strategies to encourage farm forestry

4.2.1 The 2008-2012 Strategy

In 2008, the WA Government launched *Western Australia's Strategy for Plantations and Farm Forestry 2018 to 2012*. This strategy, with implementation led by FPC but working in partnership with other government agencies, Regional NRM Organisations and industry was all encompassing with the objectives of addressing the need for forest products, environmental challenges, knowledge gaps, and social and community enhancement. Part of the implementation involved investment through the Strategic Tree Farming Project in encouraging on-farm plantings which is discussed in the next section.

Although the strategy aimed to deliver multiple benefits and its alignment with a number of other State and Commonwealth strategies and plans, it does not appear the impact of this strategy was evaluated.

4.2.2 The Strategic Tree Farming Project (2008-2012)

The Forest Products Commission (FPC) ran the Strategic Tree Farming (STF) program between 2005 and 2009 with a plan to grow 25 million trees for high value timber production in association with farmers in the south west.

The program resulted in more than 25 million trees or just over 18,000 ha planted in three years and the 2009 – 2012 Strategy for Plantations and Farm Forestry set out a plan to expand the industry.

In 2008 the Barnett Grylls Government was elected and reviewed the FPC as part of government wide efficiency drive, and funding for all new planting ceased. This was a blow to participating farmers, the industry and to WA's moves to become self-sufficient in timber production (source: <https://forestsforlife.org.au/the-plan/>).

4.3 Barriers to farm forestry

Indufor (2017) interviewed and surveyed a large number of stakeholders about the issues influencing the uptake of farm forestry with pines in Western Australia. Their findings are summarised in Figure 6. Not surprisingly, the most important barrier identified was the opportunity cost of non-forestry land use options, being the agricultural land uses discussed in Section 3. Related barriers were low log prices and the better options available with other tree species. Given the identified high demand for softwood timber, this suggested an element of market failure if that demand is insufficient to drive investment in new plantings.

In the view of the stakeholders interviewed, being able to access technical and financial information was not an important barrier, although it is worth noting that there do not appear to have been many responses from farmers to allow an assessment of how they viewed the prospects in farm forestry.

One further point is that the owners of beef and sheep farms tend to have very high equity (see Table 10), typically higher than reported for broadacre grain farms in lower rainfall areas. This suggests that 'graziers' are typically more risk averse than 'croppers', a point that has been reported in other literature. Further, there is psychological literature suggesting that an individual's appetite for risk is generally fixed, and that attempts to attract a risk averse person into a new risk environment will not be successful. For risk averse land owners, the prospect of investing in an enterprise – tree farming – that does not pay out until after 30 years may not align with their personal risk profile.

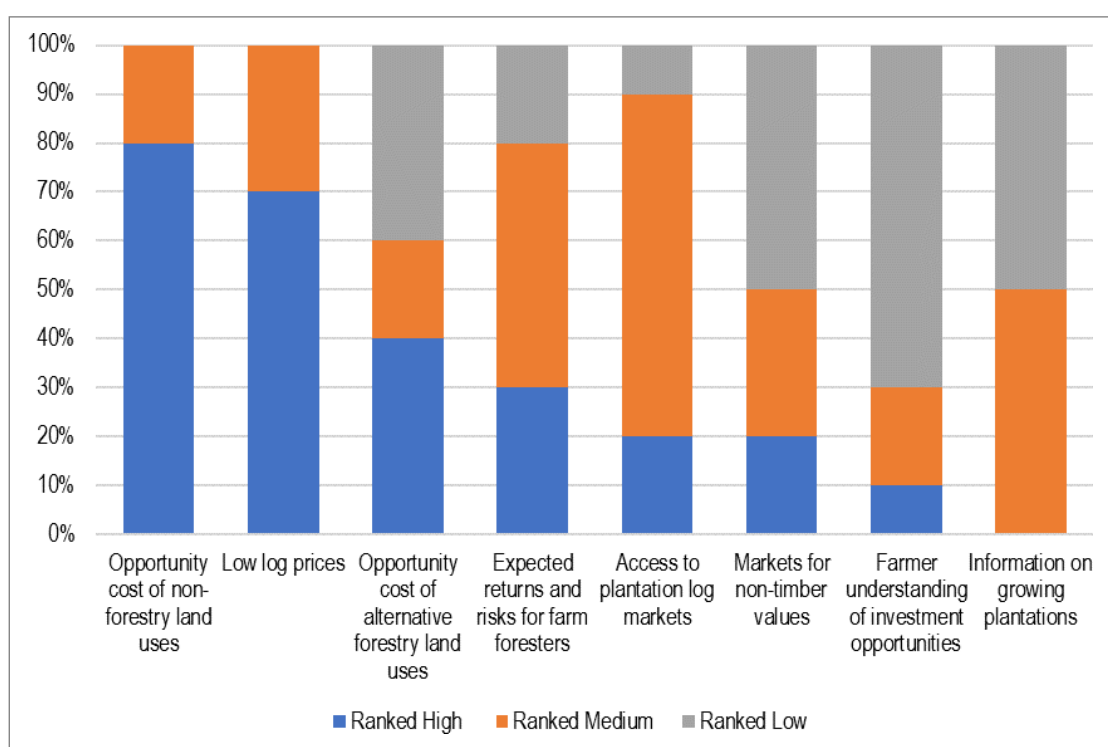


Figure 6: Barrier to farm forestry identified by Forest industry stakeholders.

Source: Indufor (2017), p. 17

4.4 Defined pros and cons of farm forestry

Based on a review of the other available literature, Table 11 summarises the community benefits, the farm benefits and factors limiting the adoption of farm forestry. These observations made across several jurisdictions replicate and extend Indufor's findings. Many of the promotional documents about farm forestry emphasise multiple community benefits (biodiversity, amenity, water management) etc, but usually these cannot be captured in financial terms by the investor (the farmer) who – in most cases according to the literature – needs to (or prefers to) allocate scarce resources to enterprises that will deliver a solely private benefit (which can sometimes be non-financial).

Table 11: The pros and cons of farm forestry

Community Benefits	Farmer Benefits	Factors Against
<ul style="list-style-type: none"> • Economic diversity • Regional development • Renewable resource • Job creation and security • Indigenous employment • Reduced imports • Carbon storage • Improved water quality • Flora and fauna habitat • Cockatoo habitat • Habitat for bees • Enhanced biodiversity • Creating areas for recreation • Confidence for forest industries and manufacturing • Wood for homes and furniture • Fibre for paper 	<ul style="list-style-type: none"> • Financial return from timber harvest • Farm enterprise diversity • Carbon credits • Shade/shelter for livestock • Improved crop yields • Productive use of marginal land • Windbreaks, shelterbelts • Reduced erosion • Flood mitigation • Improved water quality • Improved soil quality • Reduced farm effort • Effective use of farm labour • Long term investment akin to superannuation • Improved amenity • Societal contribution • Environmental contribution 	<ul style="list-style-type: none"> • Low rates of return • Length of time till financial returns • High initial capital cost • Lack of regular cash flow • Poor/disastrous performance of Managed Investment Schemes – reputation issue • No risk sharing • Uncertainty of log prices • Lack of incentives • Poor performance of comparable sites • Foregoing alternative land uses • Fire risk • Lack of land use flexibility • Community objections to 'wall-to-wall' plantations

4.5 Future prospects?

4.5.1 Suitable environments for pine plantations

Harper *et al.* (2008) defined the environmental ranges for the two pine species in consideration.

***Pinus radiata* (Radiata pine)**

- Mean annual rainfall (mm) 650 – 1800
- Rainfall regime winter/uniform
- Dry season length (months) 0 – 5
- Mean maximum temperature (o C) 18 – 30
- Mean minimum temperature (o C) -2 – 12
- Mean annual temperature (o C) 10 – 18

Pinus radiata is found naturally in a small area of California but it dominates commercial plantations in Australia: in 2000 the species accounted for about 717,000 ha or about

48% of the total plantation area. Softwood plantations were developed initially to complement the large existing source of hardwood from native forests. Many softwood species were tested, but *P. radiata* was found to be an outstanding performer under temperate conditions (i.e. warm summers, cool winters). It is typically grown in rotations of about 30 years with one or two thinnings. The thinning operations produce pulpwood and poles, while the final harvest produces timber suitable for uses such as house framing and relatively low-cost furniture.

***Pinus pinaster* (Maritime pine)**

- Mean annual rainfall (mm) 400 – 1200.
- Rainfall regime winter/uniform
- Dry season length (months) 0 – 8
- Mean maximum temperature (o C) 22 – 31
- Mean minimum temperature (o C) 0 – 8
- Mean annual temperature (o C) 13 – 18

Pinus pinaster has been successfully planted in Australia on well-drained, deep profiles of uniform sands and gradational loams (those fitting the Rudosol, Tenosol, Aeric Podosol Dermosol and 77 Kandosol classifications). In the past, *P. pinaster* has been planted on soils considered too poor for *P. radiata*. It does not grow well on clayey or texture-contrast soils, but is particularly suitable for sandy and sandy loam soils.

4.5.2 Softwood industry hubs in WA

In the State's softwood strategy, the area suitable for pine plantings as being inside the 700 mm isohyet (the black line) and within 150 km of a processing plant (Figure 7).

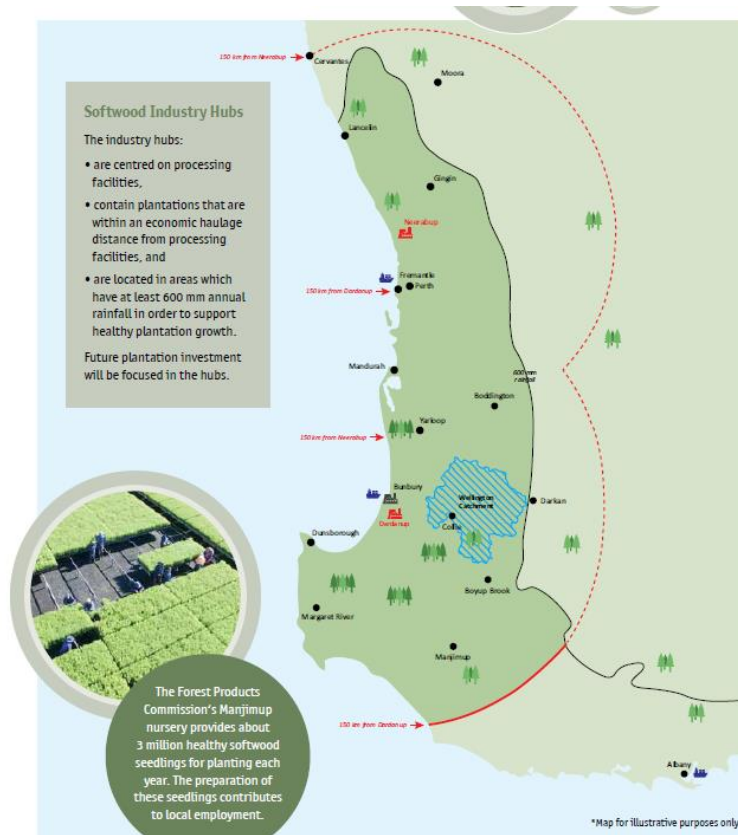


Figure 7: Softwood Industry Hubs
(Source: Forest Products Commission 2016)

The choice of the 700 mm isohyet as an outer limit to successful plantings is conservative, recognising that climate change (i.e. lower annual rainfall) may further impact south west environments (FPC pers. comm).

As noted in Section 3.1.1, if land that is well capable of supporting perennial horticulture is used as a surrogate for land is capable of supporting farm forestry, and which receives more than 700 mm, this suggests about 575,000 ha is available to support pines in the south west (i.e. south of the metro area). This land is of course privately held and already supporting a wide range of agricultural uses, and an estimated 30,000 ha of share-farmed and wholly owned trees.

To achieve the South West Timber Hub objective of facilitating the expansion of the WA *Pine plantation estate within the south west timber hub of at least 50,000 ha over 5-10 years* requires that about 9 per cent of the suitable land currently under a different use be converted to farm forestry.

4.6 Large landholdings in the south west

The Forest Products Commission has identified the top 50 cleared landholdings in the south west. These have been aggregated and sorted into corporate (mining and other), government and private owners, as shown in Table 12. The intention behind identifying these landholdings and owners is to identify parties with significant landholdings that may be open to idea of making land available for plantation development whether that be through leasing/ sharefarming, land purchase or through direct investment by the landowner.

Table 12: Largest landholders in the south west

Category	Number	Comments
Mining companies	6	Includes Alcoa, Cable Sands, Newmont, Iluka, Hedges Gold, and Sojitz Alumina, South 32
Forestry companies	1	Nippon Paper Resources
Other corporate companies	15	Comprise listed and private investment companies, some internationally owned
WA Government departments	4	Departments of Housing; Lands; Biodiversity, Conservation and Attractions; and Water
WA Government businesses	2	Synergy and Water Corporation
WA Government Authorities	2	WA Land Authority and WA Planning Commission
Private individuals	16	Farming businesses, sometimes linked with other enterprises.

FPC – top 50 cleared landholdings

The FPC have identified a sub-section of the large cleared landholdings in the south west, termed as '2018 Investor Opportunity Snap Shot', as shown in Table 13.

A search into the nature of the landholders shows that two are major mining companies, two are international investment companies, one is a major fund manager, one is an international forestry company, and the remainder are large scale corporate/family farming businesses, sometimes linked to other enterprises.

Table 13: Investor opportunities identified by FPC

Landholder	Area (ha)	Nature of landholder
Trust Company Pty Ltd	21,478	fund manager
Newmont Boddington Pty Ltd	7,094	mining company
Nippon Paper Resources Australia Pty Ltd	6,847	forestry company, linked to Mitsui and Gorgon
Alcoa of Australia Ltd	4,074	mining company
Cadogan Estates Australia Pty Ltd	3,647	British corporate farms
KLK Farms Pty Ltd	3,545	Malaysian corporate farms
DFD Rhodes Pty Ltd	2,467	family farming business
William Harvey	2,439	private farming business
Mogale Pty Ltd	1,851	private farming business
Boyagin Investments Pty Ltd	1,672	corporate farm business
Total	55,114	

Source: FPC – 2018 Investor Opportunity Snapshot

4.7 Linking softwood plantations to carbon farming

Carbon farming is the process of changing agricultural practices or land use to increase the amount of carbon stored in the soil and vegetation (sequestration) and to reduce greenhouse gas emissions from livestock, soil or vegetation (avoidance). Carbon farming potentially offers landholders financial incentives to reduce carbon pollution, but should always aim to achieve multiple economic and environmental co-benefits (DPIRD <https://www.agric.wa.gov.au/climate-land-water/land-use/carbon-farming> downloaded 9 July 2020).

Reforestation, afforestation and revegetation can sequester significant amounts of carbon per hectare. These activities as part of a formal emissions reduction program have large up-front costs and onerous permanence obligations, and cessation of income from carbon offsets once carbon equilibrium is reached. Projects on marginal land using for harvest forestry systems may offer less risk.

4.7.1 The Climate Solutions Fund

On 25 February 2019 the Australian Government established a Climate Solutions Fund to provide an additional \$2 billion to continue purchasing low-cost abatement, build on the stated success of the Emissions Reduction Fund and continue the momentum to reach Australia's 2030 emissions reduction target. The additional funding was designed to ensure Australian farmers, businesses and Indigenous communities continue to have opportunities to undertake emissions reduction projects that provide local benefits.

The Emissions Reduction Fund is established on the principles of reducing emissions at lowest cost and purchasing genuine and additional emissions reductions.

(<https://publications.industry.gov.au/publications/climate-change/climate-change/government/emissions-reduction-fund.html> downloaded 9 July 2020)

Eligible methods for carbon sequestration on farms include Plantation Forestry. This method benefits plantation forest growers or land owners interested in establishing new plantations or converting existing short-rotation plantations to long-rotation plantations. The *Carbon Credits (Carbon Farming Initiative-Plantation Forestry) Methodology Determination 2017* was made on 10 August 2017, and varied on 10 January 2020 to

remove the rainfall limit. A project eligible for carbon credits is established by the Clean Energy Regulator (see <http://www.cleanenergyregulator.gov.au/ERF/Want-to-participate-in-the-Emissions-Reduction-Fund>) with additional details presented (see <http://www.cleanenergyregulator.gov.au/csf/Pages/method-plantation-forestry.html>).

4.7.2 Current and potential trends in the price for carbon

The High-Level Commission on Carbon Prices estimated that carbon prices of at least US\$40 to 80 per tonne of CO₂^e by 2020 and US\$50–100 per tonne of CO₂^e by 2030 are required to cost-effectively reduce emissions in line with the temperature goals of the Paris Agreement. As of May 2020, less than 5 percent of greenhouse gas emissions (GHG) are currently covered by a carbon price are within this range with about half of the covered emissions priced at less than US\$10 per tonne of CO₂^e (A\$17 per tonne). Currently, the OECD uses €30 (A\$48) per tonne of CO₂^e as a benchmark level that the carbon market should be reaching, and notes that few of the current carbon pricing schemes approach the level, although there is a slow trend to increased prices (OECD 2018).

However, there are now 61 carbon pricing initiatives in place or scheduled for implementation, consisting of 31 Emissions Trading Schemes (ETSs) and 30 carbon taxes, covering 12 gigatons of carbon dioxide equivalent (Gt CO₂^e) or about 22 percent of global GHG emissions. It is worth noting that forestry sector credits make up 42 per cent of all carbon credits issued in the period 2016-2020 (World Bank 2020).

Longer term, the Australian carbon price is expected to move in line with the amount of abatement required to fulfil compliance obligations under the Paris Agreement (<https://reneweconomy.com.au/australias-hidden-carbon-price-trading-nearly-18-57648/>).

4.7.3 Likely means of accessing carbon credits

As discussed in Section 2.3.3, there has been limited take-up of the ERF mechanism for accessing carbon credits – as in ACCUs. However, there has been a substantial step up in Australian businesses focusing on climate risks as part of their overall financial risk management strategies. For example, membership in Climate Active, the rebranded Australian Government's carbon neutral certification scheme, has risen 41 per cent in 2019 from 2018 (Clean Energy Regulator 2019).

In response to the need for carbon management, some major resource companies and other large emitters have established agreements with the holders of large forestry assets to obtain carbon credits as offsets for their industrial emissions.

It is clear that landholders adopting farm forestry will want to enter the carbon market, which is estimated to add about 1.5 per cent to the returns from the enterprise. Rather than selling ACCUs in the auctions run as part of the EMF, it is likely that they will prefer to seek higher prices for the carbon they store through direct private purchaser-seller contracts with large emitters of emission. However, large emitters are not likely to want to establish many contracts with relatively small owners of farm forestry plantations. Hence there will be a role for a broker who can aggregate the small parcels of farm forestry into an estate sufficient in size to interest a major emitter.

4.8 Mechanisms used to facilitate farm forestry

A review of the literature revealed a range of mechanisms that have been advocated, and/or used in promoting farm forestry. These are listed in Table 14 and are separated

into those that are relevant to farmers who are already growing trees and those relevant to prospective tree farmers.

4.8.1 Brokering investment

Some effort has been made into attracting investment capital to plantation forestry in New Zealand with a number of investment brokers specialising in attracting local and foreign investment to agriculture and forestry. Plantation farming is marketed as impact investment for investors tiring of looking at just financial returns and wanting to see broader social and environment impacts. Linking rural landowners with the finance sector is seen as a way of overcoming a lack of financial capital to enter plantation forestry. A limitation of the impact investing approach is the small size of investments particularly for the bigger superannuation funds.

4.8.2 Support services for farm foresters

Across Australia and NZ there are a wide range of support available for prospective and operational farm foresters. Different supports are available depending on the jurisdiction. Significant advice, information, research and networking is available to operational farmers focussing on improving management processes and yields. This support is provided through formalised networks and groups often run on a membership basis. Potential new entrants to the sector have access to publicly available information and government extension services.

Table 14: Mechanisms used to encourage farm forestry

Cited Supporting Mechanisms*	Farmers already growing trees	Prospective tree farmers
Joint ventures, share farming co-investment (shared capital outlay, shared risk)	X	X
Timber price guarantees	X	X
Guaranteed market access	X	X
Carbon credits	X	X
Seedlings		X
Tool and equipment sharing	X	
Infrastructure (roads, bridges)	X	
Peer mentoring (paid)	X	
Peer mentoring (volunteer)	X	X
Master Tree Growers education	X	X
Extension services		X
Site assessments	X	X
Consulting services	X	
Information libraries online		
Economic modelling	X	
Market information		X
Case studies	X	
Research	X	
Networking	X	X
Field days	X	X
Demonstration sites	X	X

*mechanisms cited in literature across Australia and New Zealand. Not all mechanisms are currently used.

4.9 Summary

The history of efforts to encourage farm forestry is not encouraging. The promotional material stresses a wide range of benefits – public (community) and private – from investments in farm forestry. It can be argued that emphasising these wide range of benefits will attract some, but not the majority of landholders. However, this assumption needs to be tested.

Further, based on land capability, it is estimated that about 9 per cent of existing suitable agricultural land will need to be altered from its current use to farm forestry to achieve the SWTH target for pine plantings (50,000 ha). This can be considered an ambitious objective.

Although there are a large number of relatively small-scale share farming arrangements in place, FPC advise that managing these is complex. However, the Commission is open to large scale share-farming contracts, although the returns from agriculture on the large holdings may not make that option attractive.

As highlighted earlier, the failure of pine growing to attract sufficient investment by either farmers or external investors when the current and prospective demand for timber is so high suggests a form of market failure. This is only likely to be addressed by eventual increases in the price for timber and carbon, alternative means of rewarding landholders over the long period between planting and harvest, or by further direct support by governments. Finally, being able to operate in an increasingly complex and sophisticated carbon marking will be a requirement for any person or company wishing to invest in farm forestry.

5 Acknowledgements and References

5.1 Acknowledgements

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