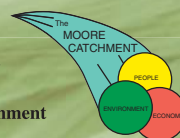


Growing Brushwood for Profit and Protection in the Northern Agricultural Region: Farm-Based Case Studies and Project conclusions



Successes, challenges and recommendations
from farmers establishing and managing brushwood
plantations in the Northern Agricultural Region

Georgie Troup



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Farm-Based Case Studies and Project conclusions

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Brushwood Project Manager,
Moore Catchment Council
PO Box 337, Moore WA 6510

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Georgie Troup

Project Manager
Moore Catchment Council
January 2008
Tel: 0408 675 787
Email: georgie.troup@bigpond.com
Website: www.moorecatchment.org.au

While every care has been taken to ensure that the information contained in this book
is the best available, it is meant as a guide only and the contributors, authors and
publishers cannot be held legally responsible for the accuracy of the contents.

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A seed collection site near Wubin.

Introduction

The purpose of this booklet is to provide an extension tool that may encourage farmers across the Northern Agricultural Region to consider diversifying into brushwood by providing case studies from farmers across the region. It is envisaged that by documenting these experiences, other landholders will be better informed, more aware of the challenges and also more educated on species selection and other obstacles that can be avoided when making decisions on the management of their saline land. The nine case studies cover an area from Calingiri to Morawa. It is important, however, to remember that this is only part of the area that this project has reached as it has also provided support to other NRM regions and community groups.

The Brushwood Industry Development on Saline Land project has been funded by the Australian Government, administered by the Northern Agricultural Catchments Council (NACC), and delivered by the sub-regional group, the Moore Catchment Council (MCC). The project has been offering landholders a seedling subsidy to encourage and support their on-farm diversification. This project was developed in response to the growing need for some alternative, profitable land uses for land at risk of or currently suffering from salinity in the medium to low rainfall areas of the Wheatbelt. The unpredictability of recent seasons provides an exciting opportunity for farmers to embrace other viable land uses, one of which is brushwood production.

Key findings

- Due to the slow growing nature of the seedlings, seed needs to be sown in the first week of December.
- Often 2 species can co-exist in an environment, so care needs to be taken when collecting seed to ensure you only collect the species you have targeted.
- *Melaleuca atroviridis* is found locally in the eastern belt of the Northern Agricultural Region and is the most suitable species for brushwood production on sandy sites.
- *Melaleuca hamata* is another locally found species which is suitable for brushwood and performs well on heavier soil types.
- Major factors affecting survival rates in this project have been: drought; time of planting; salinity; soil compaction; and weed burden.
- Brushwood requires minimal management once established. None of the project sites have been affected by pests or diseases at this stage.
- Sheep have been used for weed control at 2 sites successfully. Stock must be closely monitored and rotationally grazed, and there must be a variety of feed on offer.
- A one-pass operation has been used for planting at all sites with good results.
- The optimum time for planting is 1 July to 18 August, depending on sub-soil moisture. A later planting time may be suitable for sites low in the Region affected by waterlogging.
- Plant growth in the first year is quite slow, but by year 2 and 3 the plants growth rate increases significantly.
- Market demand for brushwood fencing is high, although mechanical harvesting is still in a trial phase in WA.



Old Melaleucas in tree form near Goodlands.

Project details

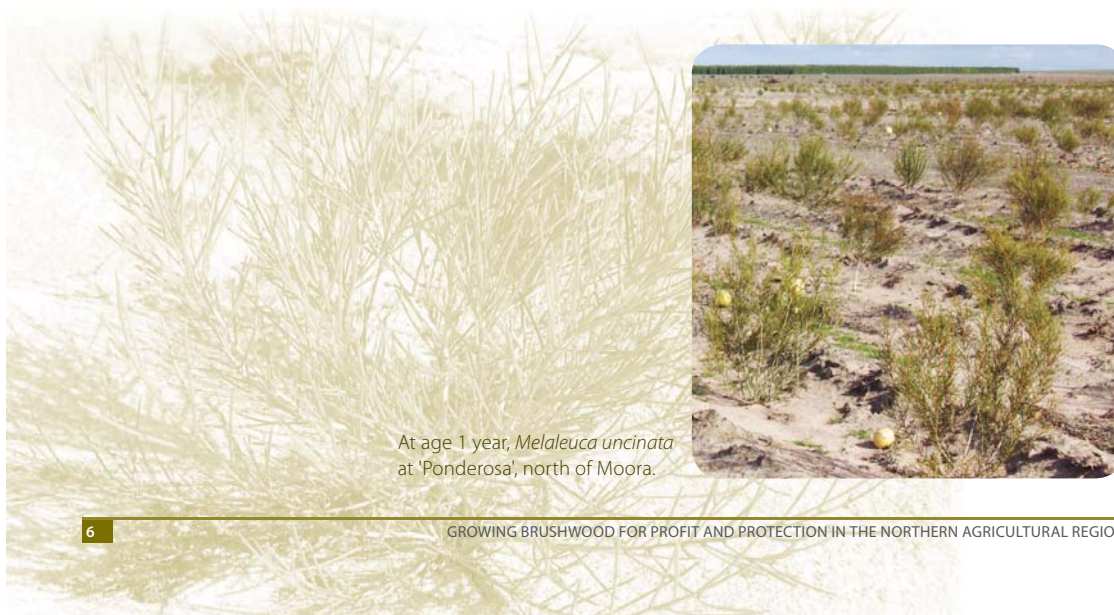
Soil type suitability and species selection

The most important lesson I have learnt about planting trees throughout this project is that if the soil type isn't conducive to that species, then you are wasting your time. It's important to know the exact location in which the seed was collected so you can match each provenance to the site-specific conditions. I would like to acknowledge the farmers who have participated in this project because every site was planted on a trial basis, and they all took a chance, mostly with great success.

It is important to realise that on the sites where these seedlings have been planted there was a desperate need for tree planting and the landowners contacted me due to this knowledge. So if nothing else is achieved on these sites, then at least there is a species that is surviving and protecting valuable pastures and cropping land.

Over the past three years there have been 50 sites planted with broombush, ranging from saline valley floor loams to mid slope wadjil sands. By far the best sites are the sands, or sand over clay. Heavy loams have been challenging during these past two dry seasons. The sandier sites performed better than the heavy loams/clays when machine planted and, in reflection, we would modify our method of planting to suit these sites (probably using hand planters).

Although *Melaleuca* are found growing in a wide range of harsh conditions in their natural environment it is important to note the difference between planting for aesthetics and planting for a commercially viable crop of brushwood. The best sites for growing broombush are those where returns from conventional agriculture are no longer greater than input costs. If your site is far too saline and/or waterlogged for cropping and bare salt scalds dominate the paddock, then growing broombush for an economic return will not be your outcome. Broombush may survive here, but the time to harvest and yield will reflect the site conditions.



At age 1 year, *Melaleuca uncinata* at 'Ponderosa', north of Moora.

MELALEUCA ATROVIRIDIS

- Shrub or tree to 12 m tall
- Papery bark, reddish-brown in colour
- Large leaf oil glands scattered
- Inflorescence width 6–10 mm
- Late flowering (December–February)

MELALEUCA HAMATA

- Shrub or tree to 5 m tall
- Papery bark, pale in colour
- Large leaf oil glands scattered
- Inflorescence width 8–20 mm
- Most common broombush in the Wheatbelt

MELALEUCA UNCINATA

- Shrub to 4 m tall
- Papery bark
- Large leaf oil glands along the four edges of the leaf blade, with smaller glands in between
- Inflorescence width 9–15 mm

Species performance

- *Melaleuca atroviridis* have been shown to perform well on mid slope sands, wodjil (deep yellow acidic) sand, and valley floor sand affected by salinity. This species has not survived well on loams and clays affected by salinity.
- *Melaleuca hamata* has proven to be the species best suited to the heavy loams that dominate the valley floors in the Northern Agricultural Region.
- *Melaleuca uncinata* (NSW provenance) was planted at two sites near Bindi Bindi in 2006 with great success. At Les and Anne Crane's site on Tucks Road, survival was 80% (100% on the eastern end and poor survival on the heavier soil at the west end), while survival of the planting at Barry Johnson's property on West Gabalong Road had over 95% survival. This survival was reduced from 100% as a result of the highly saline soils at the eastern end of the site. This species is showing good form and growth rates, although its wood is lighter in colour than *Melaleuca atroviridis*.
- *Melaleuca uncinata* (3 subspecies collected from Buntine Reserve). These three species have been very experimental for the project (we were unaware that there were three species in the seed batch!) but it has taught us a valuable lesson. When it was first discovered that there was more than one subspecies of *M. uncinata* growing in the nurseries, most the nursery managers 'pricked' out the undesirable species (one had oval leaf shape instead of needle shaped leaves) so when it came time to plant the majority were the two uncinata species that were suitable for brush harvesting. There are, however, a couple of sites with a small quantity of the undesirable species mixed throughout and these sites will be thinned to remove this species. What I did like about the mixture of suitable species is that sometimes it is difficult to choose the most suitable species for a site and combining a few species reduces the risk of having a poorly performing site.



ABOVE: 200,000 Melaleucas for brushwood.

Seed source and nurseries

Seed for the project was supplied by Greening Australia. Mark Ochtman and his team at Northam are very professional at collecting and supplying seed. The project required a few kilograms of seed, and I was aware that collecting this amount of *Melaleuca* seed was going to be a big task. Most nurseries are skilled at seed collection but I do recommend contacting a brush grower or farm forestry professional to ensure the origin of the seed is verified as suitable for brush.

There is a stand of *Melaleuca atroviridis* near Dalwallinu in which there are a few scattered *Melaleuca hamata* plants. If care isn't taken when collecting it may result in a mixed plantation. Accidentally collecting some of the wrong species is easily done. You may be wishing to have a plantation with two species, but not these two species as their growth rates may be different and the quality of their brush is different also—this will inhibit mechanical harvesting at optimum times for the faster growing species.

There are a number of plantations that were established over the past 10 years with a number of different species that have shown good characteristics for brushwood. The provenance of each species shows different characteristics and, for that reason, it is important to not only know what species you are growing but to have an understanding of where it comes from and its brush characteristics. These characteristics include:

- coppicing ability (lignotuber)
- leaf shape
- wood colour (preferably dark)
- bark texture (preferably smooth)
- time of seed set (do they seed early and/or prolifically)
- multi-stemmed, with long, thin, vertically oriented branches (at least 1.3 m).

In the first year of the project there were two different species grown:

1. *Melaleuca uncinata* (NSW provenance).
2. *Melaleuca uncinata* (3 subspecies—Buntine provenance).

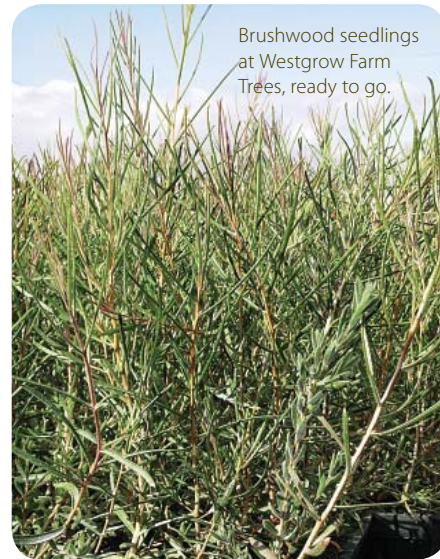
Time to plant

Planting trees inevitably comes last on the list of things that need to be done on the farm. You need to order your seedlings by December of the year prior to planting, so you have a good 6 months to forget you even ordered them. Of the case studies in this booklet there is a good mixture of planting times.

Charles Hyde of Dalwallinu likes to get straight into tree planting as early as possible. Charles likes to plant early in June when the opportunity arises and has had good survival at a moderately saline site. The high clay content at this site ensured the soil sampler couldn't even drill to get a sample!

In a completely different situation David and Irene Moore's site in Miling was planted in the second week of September 2006. This is a less than ideal situation but due to the drought in the Northern Agricultural Region during this time we had two options: plant at Miling in September or throw out 25,000 seedlings. Since I had already had to ask a couple of nurseries to throw out a few seedlings already I couldn't bear the thought, and we went ahead with planting.

On the first day of planting there was enough moisture to make for good planting but it quickly dried up and the next couple of days were horrible, dusty work on the tree planter. In the weeks following planting, the seedlings were hand watered and in hindsight we shouldn't have planted them after all. September is too late. There was little rain after we planted them, and then the locusts came—and stayed. This site had the biggest challenges of them all and it still amazes me to see the broombush as I come down the hill.



Brushwood seedlings at Westgrow Farm
Trees, ready to go.



Robert Keamy of ANRO has planted 100,000 *Melaleuca* seedlings for brushwood production in 2008.

Time of planting is very site-specific. On waterlogged sites you have the choice to wait until August. On drier sites or on the stereotypical saline loams of the region you need to be prepared in mid-June for the opportunity to plant.

Site preparation, weed control and grazing

Site preparation is very site specific. It is important that the seedlings enter a weed-free environment, with the only exception being on a site prone to wind erosion. On sands prone to wind erosion over the summer months it is important to leave a vegetative cover present to prevent sand blasting of the seedlings.

Heavy grazing and spray topping in the year prior to planting has been the most beneficial tool for site preparation. On sites with a heavy weed burden it is beneficial to apply a knockdown herbicide 2-4 weeks before planting.

Mounding has proven to be beneficial on sites that are waterlogged and/or saline. This has, however, not been done successfully in this project because the moulder did not make an adequate mound. Since this time the moulder has been modified, although it works best in lighter, sandy soils. If you need to mound because the site is so salty that the seedlings wouldn't grow otherwise, then you should look at planting something else because planting broombush for a commercial product will not be viable.

A one pass operation was recommended for all sites in this project and has provided good planting results. A shallow scalp has proven to be beneficial in controlling weeds for the first 6 months while the seedlings establish.

BELOW:
Brushwood
south of Yerecoin.





Due to the poor seasons in 2006–2007 there has been little need for weed control after planting in the northern half of the region.

Nick and Sam Woods at Calingiri have been managing weeds by controlled grazing, which has proven to be an excellent management tool when used carefully. Controlled grazing has also been practised at Les and Anne Crane’s at Bindi Bindi where the weeds in the plantation have provided good feed value between October and December 2007.

ABOVE:
Melaleucas for profit and land protection.

BELOW:
Aaron Mills is relieved to finish the 50,000 seedling project at their property east of Dalwallinu.



Brushwood in the Northern Agricultural Region

In 2006 we grew *Melaleuca uncinata* (3 different subspecies collected from Buntine Reserve).

Landholder	Number of seedlings	Location planted
Jo and Annie Kohlen	80,000	Moora
Hal Harris	3000	Dalwallinu
David and Irene Moore	25,000	Miling
Barry and Margaret Johnson	10,000	Gabalong
Nick and Sam Woods	28,000	Calingiri
Louise Plant	5000	Calingiri
Fiona and David Falconer	10,000	Coorow
Barry Fowler	10,000	Coorow
Les and Anne Crane	25,000	Bindi Bindi
Yvonne Marsden	20,000	Geraldton
Debbie Collins	25,000	Morawa
Stan and Anne Lewis	20,000	Bindi Bindi
Rewards Group	80,000	Dowerin

In 2007 we grew *Melaleuca atroviridis* and *Melaleuca hamata*; these were allocated to the following:

Species planted	Landholder	Number of seedlings	Location planted
<i>Melaleuca atroviridis</i>	Peter and Paula Syme	60,000	Wubin
<i>Melaleuca hamata</i>	David and Irene Moore	20,000	Miling
<i>Melaleuca atroviridis</i>	Neil Smith	20,000	Piawanning
<i>Melaleuca atroviridis</i>	Barry Fowler	10,000	Coorow
<i>Melaleuca atroviridis</i>	Fiona and David Falconer	10,000	Coorow
<i>Melaleuca hamata</i>	Shane and Emma Kelly	10,000	Gillingarra
<i>Melaleuca atroviridis</i>	Rob and Jo Harris	40,000	Dalwallinu
<i>Melaleuca atroviridis</i>	Lyn and Bruce Ovens	10,000	Coorow
<i>Melaleuca atroviridis</i>	Graeme and Karen Lehmann	20,000	Pithara
<i>Melaleuca atroviridis</i>	Charles and Gwen Hyde	12,000	Dalwallinu
<i>Melaleuca hamata</i>	Yarra Yarra Catchment Management Group	150,000	Bowgada
<i>Melaleuca atroviridis</i>	Gene and Amanda Hannington	15,000	Coorow
4000 <i>Melaleuca atroviridis</i> and 8000 <i>Melaleuca hamata</i>	Cathy and Peter Cooke	12,000	Kalannie
<i>Melaleuca atroviridis</i>	Yvonne Marsden	10,000	Geraldton
<i>Melaleuca atroviridis</i>	Tim Emmott	200,000	Avon Catchment Council/Rewards Group

In 2008, we have grown *Melaleuca atroviridis* and *Melaleuca hamata*. These have been allocated to the following landholders:

Species	Landholder	Number of seedlings	Location planted
<i>Melaleuca atroviridis</i>	Neil Smith	35,000	Piawanning
<i>Melaleuca atroviridis</i>	Robert Keamy	100,000	Watheroo
<i>Melaleuca atroviridis</i>	Ian McGillivray	10,000	Koojan (south of Moora)
<i>Melaleuca atroviridis</i>	Yarra Yarra Catchment Management Group	47,500	Burakin
<i>Melaleuca atroviridis</i>	Noel and Kathy Mills	50,000	Dalwallinu
<i>Melaleuca atroviridis</i>	Peter and Paula Syme	20,000	Wubin
<i>Melaleuca atroviridis</i>	Charles and Gwen Hyde	20,000	Dalwallinu
<i>Melaleuca atroviridis</i>	Russel King	5000	Calingiri
<i>Melaleuca atroviridis</i>	Angela and Roger Dring	20,000	Carnamah
<i>Melaleuca hamata</i>	Yarra Yarra Catchment Management Group	80,000	Jibberding
<i>Melaleuca hamata</i>	Rob and Jo Harris	40,000	Dalwallinu
<i>Melaleuca hamata</i>	Ian McGillivray	5000	Koojan
<i>Melaleuca hamata</i>	Peter and Paula Syme	25,000	Wubin

Interest in growing Melaleucas for brushwood production is increasing — a field day at Southern Brook.





ABOVE:
Mike Kerkman's innovative planting system using twin Chatfields chain-driven planters with watering system.

Tree planting innovation

In mid-June I had the opportunity to visit Mike Kerkman's property east of Pindar. Mike is an instrumental leader in the Oil Mallee plantings across WA with innovative ideas. It was one of his ideas that I had travelled to see for myself. Mike had developed a watering system to increase the survival rate of his tree planting effort in 2006 as a direct response to the worst drought in history for that region—that is, until 2007 came around! The photo above shows Mike's setup.

The first innovation is the 1800 L tank being towed behind the chain-driven Chatfield's tree planter. The tank, fitted with a pump, delivers water to the operator of the tree planter. Water fills the box at the base of the tree planter and, as a tree is planted, approximately 1 L of water goes with it. When we dug up a freshly planted seedling there was a plentiful supply of moisture directly at the root ball of the plant.

I believe this method should be adopted across the entire region, because tree planting is a costly exercise and any possible measure that will increase the survival and overall health of our seedlings will be of great benefit.

The establishment conditions have been shown to affect plant health for the remainder of that plant's lifetime, therefore if we improve conditions at planting then plant vigour and yields are expected to be higher.

Secondly, you would have noticed not one but two tree planters. Using a bar manufactured on the property, Mike has connected two tree planters to the tractor. The two chain-driven Chatfield's enable a greater number of seedlings to be planted, and by doing so he can take full advantage of the often small windows of opportunity for doing large-scale plantings. I have found that even when planting 50,000 seedlings over a week the soil can significantly dry out and survival rate is exponentially reducing from the first day of planting.



Brushwood Project Site 1: Demonstration Site

Peter and Paula Syme of 'Harolds Park', Wubin

Great Northern Highway, Wubin

Site description: 3 sites

1. Upslope: wodjil sands.
2. Valley floor: heavy saline loam.
3. Valley floor sand showing signs of salinity.

Date of initial contact

12th December 2005.

Main farm location

2 km north of Wubin on the Great Northern Highway.

Project site location

9 km north of Wubin on the Great Northern Highway, on the south side of the road.

Date planted

August 2007, planted over three events. Loam planted first, then hill slope wodjil sand, then low lying white sand alongside remnant Melaleuca.

Site preparation

Site preparation began in early 2006, mounding on saline loam. This was

ABOVE:

Eastern end of the demonstration site at the time of planting; heavy loam dominated by bluebush.



unsuccessful as the moulder didn't work well in heavy soils. A better method would have been to deep rip the entire site first so the moulder could churn up more soil. Since this time modifications have been made to the MCC moulder to make it more suitable for heavier soils and to create a furrow at the top of the mound for planting.

At the time of planting we used a machine planter and used the ripper to run along the mounds—this effectively destroyed the mounds.

Due to the poor rain during the season there was no need to do any weed control... because nothing had grown.

Method of planting

Used Chatfield chain driven planter and contractors to plant on half of the loam and hill slope. The Project Manager and I planted the remainder following rain using the Nugadong LCDC's Chatfield planter about a week later. There didn't appear to be any difference in survival using the two different planters; either way the loam was doomed from lack of rain. On the other hand the two sandy sites had great survival—a direct reflection on the plant's ability to reach water. The heavier site was more saline.

Monitoring

There are monitoring bores installed at this site. There is a control to measure the ground water level outside the project area, and an experimental bore within the loam project site. Due to the poor survival on the loam there is no effect as

MAIN PHOTO:

Demonstration site, western end of drain.

INSETS FROM TOP:

Lack of rain following planting meant only a small survival.

Wodjil sand is the natural environment for these seedlings, and they are growing well here.

A good survival rate on the hill slope sand, although some damage from feral animals.



there aren't any seedlings in the area. It has given the project more time to monitor the groundwater level prior to planting though. The landholder will be provided with a measurer when the project ceases so they can continue monitoring their bores.

Water quality test results

Water samples were taken from the experimental bore located in the middle of the plantation. The water was then analysed by Nufarm. Results are shown in the table below:

Category	Sample result	Ideal range	Comment
pH	6	<7.0	Mildly acidic
Salt (ppm)	23,863	<1000 ppm	Very high
Total hardness (ppm)	3803	<300 ppm	Very high
Total dissolved solids (ppm)	27,240	<2000 ppm	Very high

MAIN PHOTO:
Experimental bore on the demonstration site.

INSETS FROM TOP:
Kangaroos caused a lot of damage at this site in January 2008. This site will be replanted in places, and control of the kangaroo population will also help.

The Symes' property—the view from the gate.

Peter Syme of 'Harolds Park' amongst 1-year-old Melaleuca seedlings.



Brushwood Project Site 2

Rob and Jo Harris of 'Moorelands', Dalwallinu

Dalwallinu West Road, Dalwallinu

Site description: Valley floor loam affected by salinity

Main farm location

Dalwallinu West Road.

Project site location

12 km west of Dalwallinu.

Affected area

50 ha, only planted 20 ha.

What methods have you used to combat salinity in the past?

Shallow relief drain. Fenced to exclude stock in the past, however stock are no longer on the property.

Area planted

20 ha.

Species planted

M. atroviridis.

ABOVE:

Before planting the site was dominated by salt-tolerant plants.



Date planted

24th July–1st August 2007, planted with Chatfields tree planter from the local LCDC.

Site history

Natural drainage line that is prone to waterlogging and salinity. A 'W' drain was installed in 2003 to assist in the movement of water. Stock has been excluded and native vegetation has been recolonising the area. It has been ploughed a few times since the drain was installed. The project area hasn't been in crop for over 20 years due to the waterlogging and salinity.



MAIN PHOTO:

Rob and Jo Harris' site prior to planting, iceplant dominating the site.

INSETS FROM TOP:

M. atroviridis tolerates a long hot summer at Dalwallinu.

Melaleuca atroviridis survives 6 months of dry weather.

Rainfall

Year	Total annual rainfall (mm)
2007	276
2006	286
2005	307
2004	259
2003	335
2002	272

Soil type

Typical low lying loam with clay in patches.

Water

Prior to the instalment of the W drain you could not drive on the area without getting bogged. Since then you can drive on it year round. Prior to the drain, pits were dug to 2 m and

there was water in them. There is no water in those pits anymore. The salinity in the pits varied greatly, ranging from fresh to hypersaline.

Site preparation

The project area was ploughed to smooth it out and then sprayed with 1 L glyphosate in June 2007.

Method of planting

Seedlings were planted at 1 m spacings within the row, 4 rows per cycle, rows 2m apart. The seedlings had been on farm for a month while we were waiting for rain to plant and were watered twice a day during this time.

Monitoring

Monitored regularly for pests/weeds.

Where does broombush fit into your farming enterprise?

We planted broombush to plant something on unproductive land. We chose broombush because it was funded and has the potential to have some economic benefit, although if it doesn't there is no loss.

What would you do differently in future?

I don't think we could do anything differently. It was probably too wet when we planted so it was pretty claggy. But in an area like that if you don't do it when you can there may not be another opportunity. I would probably spray it with glyphosate later in the year, I would have done it but I was too afraid that it may damage the seedlings. In hindsight the species we used was not the most suitable for the site. In 2008 we will be planting *M. hamata* which should perform better on the heavier soil.



Brushwood Project Site 3

David and Irene Moore of 'Beringarby', Miling

Watheroo Miling Road, Miling

Site description: Valley floor loam at the upper reaches of the Moore River. Affected by salinity and seasonal waterlogging at the western end of the site.

Main farm location

12 km north of Miling on the Watheroo Miling Road.

Project site location

At the main farm, 2 km east in the creek line.

Site preparation

Western half of the project site was ripped using an air seeder bar. There was nothing growing there, so there was no need for weed control in the first year of planting. No spraying was done in 2007, although it could have benefited from this because when we planted all the weeds came up.

Method of planting

First year of planting we used a D4 bulldozer with a 3 point linkage tree planter. The tree planter had a scalp blade on it. The only problem with this tree planter was that it was very hard work for the person planting as the seat

ABOVE:
Changing a salty, waterlogged environment.



was too far from the furrow. In the second year of planting we used a LCDC planter which was much easier to use.

Monitoring

Survival counts conducted in January 2007. Monitoring of the two bores installed at the project site has been conducted on a regular (monthly) interval by the project manager.

Area of salt-affected land on the property

430 ha.

What methods have you used to combat salinity in the past?

Exclusion fencing. Planting of trees and saltbush. Some 'W' drains were installed in some patches, which have worked really well.

Area planted

9 ha in 2006 and 8 ha in 2007

Species planted

M. uncinata (3 subspecies from Buntine) in 2006; in 2007 *M. atroviridis* was planted and used for infilling.

Date planted

M. uncinata planted in 1st September 2006; infilling with *M. atroviridis* in August 2007.

Site history

Back in the early 60's the project area was a very productive piece of land but it has slowly deteriorated over the years.

MAIN PHOTO:

The Moores' site, planted September 2006—freshly planted, no rain and locusts on the way!

INSETS FROM TOP:

After the hard work is done, you need to keep your fingers crossed for rain.

Brushwood seedling 6 months after planting—very hardy seedlings.

1-year-old *Melaleuca* seedlings at 'Beringarby'.



MAIN PHOTO:
Brian Cahill drilling to install a monitoring bore at 'Beringarby'.

INSET:
In years to come this paddock will be a source of income for the farm.

It used to grow wheat and barley well without any fertiliser on it and produce great crops... but things change. It is all part of the silt plain of the river that flows through the farm. There was a big bare patch of waterlogged ground from the sandplain seep when it comes up against the clay soils of the valley floor, unable to flow into the creek line.

Crop rotations on project area at 'Beringarby'

Year	Pasture/Cereal crop
2002–2005	Pasture
2001	Cropped the 'good' patches of paddock

Rainfall figures for the previous 4 years at 'Beringarby'

Year	May–September rainfall (mm)	Total annual rainfall (mm)
2004	253.5	308.5
2005	298.0	357.5
2006	131.0	347.5
2007	179.0	285.5

Method of planting

2006 planting: The area was planted using a tree planter with a small scalp blade and shallow ripper. The seedlings were planted at 3333 stems per hectare. The site layout is 4 rows, 2 metres apart then a 4 metre gap for vehicle access. There is 1.2m between trees

within the row. Infilling was done on the August 2007 using hand planters.

2007 planting: We used a different tree planter which also had a scalp and ripper—much easier for the person doing the planting. Same density and spacings as before.

Grazing

The area has not had stock in it as yet. It is planned that, in winter 2008 when the grasses grow, that stock will be in the area for rotational grazing. Monitoring will be done for any grazing on the broombush.

Where do you see broombush in your farming enterprise?

We were going to plant trees and this was something different from saltbush. Hopefully, down the track, there will be a couple of bucks in it.

What would you do differently in future?

I wouldn't use a bulldozer, as a good tree planter goes a long way. The first year was really dry and we had to water the seedlings, and I didn't like doing that much. We could have waited for the following year when there was more favourable conditions which would have reduced the amount of infilling needed.



Brushwood Project Site 4

Barry and Margaret Johnson of 'Gabalong', Bindi Bindi

Gabalong West Road, Bindi Bindi
Site description: Sandy loam becoming
affected by salinity near watercourse.

Main farm location

Gabalong West Road

Project site location

2 km south from Clarke Road, M918. Area of salt-affected land on this location.

Affected area

30 ha.

What methods have you used to combat salinity in the past?

Fencing to exclude stock from the saline land. Planted trees.

Area planted

Site A: 2.5 ha; Site B: 4.0 ha (2006)

Species planted

Site A: *M. uncinata*; Site B: *M. uncinata (atroviridis)*.

ABOVE:
Melaleuca atroviridis
performing well
(photo taken
14 months after
planting).



Date planted

Site A: 23 August 2004;
 Site B: 3 August 2006 + Direct seeding in mild scalping.

Site history

The area planted was growing cereal crops up to 1998, although the valley floor was planted in trees in 1980 and fenced as there was salinity 1.5 km down the catchment. A problem appeared shortly after major early autumn rain in 1999 (the Moora flood). Site A no longer grew a profitable cereal crop. Site B started to deteriorate at about the same time, but was not as pronounced.

Crop history

Year	Pasture/Cereal crop
2006	Wheat
2005	Canola
2004	Pasture
2003	Pasture
2002	Wheat
2001	Lupins

Rainfall

Year	Total annual rainfall (mm)
2007	341
2006	276.3
2005	403.8
2004	300.5



MAIN PHOTO:
Melaleuca uncinata planted 2006: 18 months after planting this site is very impressive.

INSETS FROM TOP:
 3-year-old Melaleucas planted in 2004.
Melaleuca uncinata at 14 months, 45 cm in height.
 Cutting trial amongst Barry Johnson's Melaleucas..

Soil type

Good sandy loam over sandy gravel at 30–40 cm, to sandy gravel clay below.

Water

Water has always been present in the valley and could be considered a wet area, although not boggy in winter. It is damp at post hole depth in summer. A good water supply exists at the western end of the site (3000 mg/L to 10 m) sitting at 1 m during winter.

Site preparation

Site B was sown to wheat as per cropping plan. The site was sprayed with the following:

Timing	Chemical	Rate
1st Spray	Glyphosate	500 ml
	Garlon®	0.40 ml
	Ester® 80	250 ml
2nd Spray	Glyphosate	700 ml
	Hammer®	70 ml
	Logran®	30 g
Seeding	Treflan®	1.7 L

The area was planted without spraying.

We did not think the crop would come to much, but it should have been sprayed out. This was planted with the same machine as site A, which scalped and ripped in a one-pass operation.

Being a dry year the wheat crop turned out quite reasonable. It sheltered the seedlings from the wind, but obviously used moisture.

Method of planting

We aimed to put the seedlings every 1 m with 2.5–3 m between each row. Infilling was done in September and August 2007 with a hand planter, with mixed results. There was heavy weed competition from capeweed, radish and ryegrass.

Monitoring

Monitored regularly for pests/weeds, and the bores are checked on 6 weekly bore run. There are weeds present, and the site could benefit from grazing.

Where does broombush fit into your farming enterprise?

We are considering using it in areas with a water table close to the surface, not too saline, and able to still grow some wheat and at least barley grass. Broombush could provide some income replacement while lowering the water table and acting as a windbreak. We need to be able to control weeds, especially in the first two years. After this, if the stand is heavy, winter weeds are not a big problem. However the stand can harbour melons in summer. The broombush provides ideal habitat for the grey kangaroos, although they can cause damage if they are in large numbers. They will deliberately knock over a campsite, and the young males use the broombush to playfight.

What would you do differently in future?

- Plan the site better (e.g. row spacings, number of plants on order to fit the available space).
- Spray well ahead and summer spray if necessary to keep the site clean.
- Plant into a clean area, not at the last minute as an impulse.
- Establish the best variety and fence post-planting, not before.
- Plant as early as possible—depending on moisture reserve and the water table for that year. Advice would be needed if planting into boggy, waterlogged conditions—this site doesn't have that problem.



It's great to see a farm product benefiting from the summer rainfall.



Brushwood Project Site 5

Les and Anne Crane of 'Burra Burra', Bindi Bindi

Summers East Road, Bindi Bindi

Site description: Gravelly loam to sandy loam over clay. Affected by salinity.

Main farm location

Summers East Road, between Bindi Bindi and Piawanning.

Project site location

2 km north east of the main farm, on the same road.

Area of salt affected land on the property

800 ha.

What methods have you used to combat salinity in the past?

Exclusion fencing, planting of trees, shallow drains and saltbush. This has been successful, although each method is very site specific.

Area planted

8 ha.

Species planted

M. uncinata (vital plants), *M. uncinata* (NSW prov. Wongan Trees).

ABOVE:

A nearby stand of *Melaleuca atroviridis* is a valuable asset for seed collection.



Date planted

M. uncinata planted in 2006; infilling with *M. atroviridis* in September 2007.

Site history

Prior to 10 years ago there was no problem with salt in this area of the property. Within the past 10 years the area developed a waterlogged (saline) appearance.

The site is on a change in landscape from a lateritic sandy/gravelly rise to red loam flat (salmon gum/gimlet country). There is shallow laterite in many parts of the rise.

The site was not producing viable yields of any crop in wet years, with some barley in a dry year. In the last few years the northern edges were showing very bare patches even when sown to a cereal crop, indicating salinisation. In 2005 we were suffering significant bogging problems with plant equipment.

Crop rotations on project area at 'Burra Burra'

Year	Pasture/Cereal crop
2005	Lupins (horribly bogged and poor crop in project area)
2004	Barley
2003	Pasture
2002	Pasture

Rainfall figures for the previous 2 years at 'Burra Burra'

Year	May–September rainfall (mm)	Total annual rainfall (mm)
2007	237	362 (10% wetter than average)
2006	154	316 (10% drier than average)

MAIN PHOTO:

Grazing for weed control proving very effective at Gabalong.

INSETS FROM TOP:

Newly planted seedlings surviving their first summer at Gabalong.

Les & Anne Crane's brushwood plantation, Tucks Road, Gabalong.

Young seedlings barely visible in the first year.

Site preparation

The site has been sprayed numerous times to control weeds and pests (see table below).

Spray timetable for brushwood site at 'Burra Burra'

Date	Chemical	Rate
10 February 2006	Garlon®	60 mL/ha
10 February 2006	Ester	360 mL/ha
15 May 2006	Atrazine®	1 kg/ha
24 May 2006	Telstar®	200 mL/ha
24 May 2006	Chlorphirofhos	70 mL/ha
7 June 2006	Paraquat®	800 mL/ha
31 July 2006	Spray.Seed®	2.5 L/ha

The area was then marked out using a chisel plough, lifting up all the surplus tynes where there would be no rows. The site was then ripped to 75cm. The rest of the paddock was cropped with barley in 2006. The project area was exclusion fenced in February 2007. Stock had been excluded from the area, other than wayward kangaroos.

Method of planting

The area was planted using a tree planter with a small scalp blade and shallow ripper. The seedlings were planted at 3333 stems per hectare. The site layout is 4 rows, 2 metres apart then a 4 metre gap for vehicle access. There is 1.2m between trees within the row. Infilling was done on the 1st September 2007 using hand planters.

Grazing

We started to utilise the project area for grazing on the 23rd October 2007 to control ryegrass and other groundcovers. There were 300 weaners (sheep) grazing on the 8 ha project site for 7 weeks, and they certainly knocked back the ryegrass. The stock was fed lupins on a weekly basis during this time, and I monitored closely for signs that the stock were beginning to eat the broombush. Only a small number of seedlings were damaged by trampling. The area has been largely unstocked since. Being able to graze this land means that you effectively aren't afraid to put more broombush in because you don't lose any grazing value. We aren't set stocking the area, only rotationally grazing.



ABOVE: 300 sheep grazing on 8 ha for 7 weeks.

Where do you see broombush in your farming enterprise?

Sandy surface soils with a water table close to the surface are proving to be the best sites, and now that we can graze them they are much more appealing. We are unsure how they will go with cattle grazing in the site in the future. All of these types of activities are relative to cash flow and economics, although being able to maintain groundcover is essential and controlled grazing is paramount.

What would you do differently in future?

Before we put any more in, we would like to find out what is affecting its growth in some of the areas of the site—what constraints there are to its survival with regards to soil type, waterlogging and salinity?



Brushwood Project Site 6

Graeme, Karen, Mark and Rachel Lehmann of 'Amyvale', Pithara

Pithara–Northam Road, Pithara

Site description: Sandy soil becoming affected by salinity. Performing poorly.

Main farm location

11 km south of Pithara on the Pithara–Northam Road.

Project site location

At the main farm, just north of the house along the Pithara–Northam Road.

Date planted

Planted in August 2007.

Site preparation

Ripped the site early on to get good weed germination, then following germination we sprayed the site with Roundup. This had a good effect leaving a clean site for planting.

Method of planting

One-pass operation using a Chatfields tree planter from the local Pithara–Dalwallinu LCDC. We found you need at least four people to plant to make it

ABOVE:

Lehmann's site lies between the grade bank in the foreground and the trees in the background. Site planted January 2007; photo taken 2008.



easy: one driving, one planting, another keeping you loaded with trays and the last to ensure the seedlings are going in the ground well.

Monitoring

The project manager keeps a close eye on the trees, and I go down and visit them every couple of months. They don't need much attention. Soil sampling was done in December 2007—results are shown on next page.

Monitored regularly for pests/weeds, site is clean and free from weeds, and seedlings are growing quickly on the sandy soil with water close to the surface. The summer rains were very beneficial.

Size of the farm

2800 ha.

Area of salt-affected land on the property

There is a lot of lake country that has been saline from the beginning. The area of land that has been salt-affected as a result of farming would be only 100 ha. It hasn't got any worse since I have been here, as we try to keep on top of it.

Methods used to combat salinity in the past included fencing areas to protect for a long time—there are a lot of areas where we have fenced and planted in the past. We plant trees every year on areas that need attention.

Area planted

8 ha.

MAIN PHOTO:

5 months after planting the seedlings are the only greenery in the paddock.

INSETS FROM TOP:

This site south of Pithara has performed well, with over 95% survival rate, planted in 2007.

The beginning of a change, once a barley paddock, now a brushwood plantation.

Date of planting:

End of July 2007.

Site history

It was only really barley country as it wasn't good enough for wheat. We put an interceptor bank around it 20 years ago, but I don't have a lot of faith in interceptor banks. I don't think it did a scrap of good. I think there were some sand seams that were going underneath the interceptor banks, so it was just stuffing it up anyway.

There is some bush just lower in the catchment, and the big trees were dying. We needed to put a stack of trees above it so the water could be used. We were hoping that trees for only 4c would do the same job as the seedlings for 40c. It was one way of putting in a stack of trees to fix the problem. Initially, I was only going to plant 10,000 but there wasn't much point in cutting the paddock in half so I decided to fill the whole 8 ha up.

It was beginning to fizz out right in the middle although the outside would have been reasonably good, but it was never put in properly because it was always the 'last resort' paddock; pretty unproductive. It was fizzing out to 0.2 or 0.4t/ha (one bag crop in the middle of the paddock).

Rainfall figures: XX??

Where do you see broombush fitting into your farming business?

I didn't put them in as a money spinner; it was to see if we could dry that dirt out without putting thousands of dollars into deep drain. If they were worth anything at the end of it, well, that would be a bonus. Basically it was to solve a problem, and if it works here well I'm sure we have a lot of other places where we could do the same thing.

What would you do differently in future?

If I had plenty of different sites, I would chose a site without tumbleweed—but the tumbleweed seems to grow on those parts of the paddock that you want to fix up. I don't think I would do a lot different otherwise.

Note: We had a problem with prickly tumbleweed in February 2008. We knocked out the tumbleweed when they were still green using the heavy fire harrows, dragged it over the trees after the rain (15mm), so the ground was reasonably wet and the tumbleweed came out the ground quite easily, the seedlings just laid over when the harrows went over them and flicked back up again without any damage. Even the wheel on the harrow didn't damage the trees; I straddled a couple of rows when I was doing it.



Brushwood Project Site 7

David and Fiona Falconer of 'Raywood', Coorow

Coorow–Latham Road, Coorow

Site description: Valley floor loam dominated by salt-tolerant species and annual grasses.

Main farm location

12 km east of Coorow on the Coorow–Latham Road.

Project site location

4 km north on Lampard Road, off the Coorow–Latham Road.

Date planted

Multiple plantings on east and west side of Lampard Road.

On east side are Search Project plantings from 2002–03.

First year species: *Melaleuca lateriflora*, *Melaleuca acuminata*;

Second year: *Melaleuca uncinata*.

On the west side are the Search Project planting and the two years on Brushwood project planting.

ABOVE:

Melaleucas planted by the Search Project; age 6 years.

Site preparation

Minimal weed burden on the site; small amount of iceplant on the site; quite bare.

Method of planting

Used Chatfield's tree planter in a one-pass operation.

Monitoring

Survival counts conducted in January 2007. Monitoring of the two bores installed at the project site has been conducted on a regular (monthly) interval by the landholder.

There is a control and experimental bore on this site, installed by Brian Cahill. Neighbouring landholders have seen this site and planted in 2006 and 2007.

Water table:

1.27 m to water, control EC 3600ms/m.

Experimental:

1.77 m to water, EC 3240 ms/m.

Date recorded: 9/2/2007.

Area of salt affected land on the property

4000 ha arable, 200 ha salt-affected.

What methods have you used to combat salinity in the past?

Contours: they did the job to control erosion/water, now we are ploughing them out. We planted 10,000 oil mallees for salinity management, largely in the upper landscape along contours in 1999; otherwise we have used biodiversity plantings to rehab salt affected areas, and fenced off remnants. We then took the stock out all together.

Area planted

3.85 ha planted in 2000, first year of Search Project.

4 ha planted in 2001, second year of Search Project.

3 ha planted with Brushwood project in 2006.

5.5 ha planted with brushwood project in 2007.

Species planted

Melaleuca lateriflora, *Melaleuca acuminata* and *Melaleuca uncinata* with Search Project; *Melaleuca uncinata* from Buntine-Greening Australia WA collection in 2005, planted in 2006; *Melaleuca atroviridis* planted in 2007.

Date planted

Search Project was planted in June 2000.

We planted the seedlings from the Brushwood Project in July 2006 and 2007; most were watered in. We watered them with approximately 0.7 L each.

Site history

This area was in crop in the 1990's. It was hardly worth harvesting, and the crop was just a ground cover, so we thought we might as well fill it up with trees.

Rainfall figures for the previous two years at 'Raywood'

Year	May-September rainfall (mm)	Total annual rainfall (mm)
2005	312.5	329.2
2006	123.0	227.2
2007	154.5	235.0

David Falconer checking an experimental bore.





Brushwood Project Site 8

Nick and Samantha Woods of 'Damara Downs', Calingiri

Goudge Road, Calingiri

Site description: Buffer zone along a watercourse, including a soak upslope producing a large volume of water causing localised waterlogging.

Main farm location

7km north on Goudge Road, west of Calingiri.

Project site location

At the main farm, along the creek line.

Date planted

August 2006, used contract planter, in a one-pass operation to plant 28,000 *Melaleuca uncinata* seedlings.

Method of planting

Used a conventional tree planter and contract planters. Planted along creek line and worked up the slope, covering an area affected by waterlogging.

Monitoring

There are monitoring bores installed at this site. There is a control to measure

ABOVE:
The Woods' plantation, planted in 2006 with *Melaleuca uncinata*.



MAIN PHOTO:

Damaras have been used for grazing at Wood's property.

INSETS FROM TOP:

Using Melaleucas to improve the health of the catchment.

Fencing to exclude stock is a key management tool.

the groundwater level outside the project area, and an experimental bore within the project site, above the soak. The landholder will be provided with a measurer when the project ceases so they can continue monitoring their bores. Survival counts were conducted in February 2007, and a 95% survival rate was recorded.

On recent inspection of the trees the project manager was pleased with the growth of the trees; it appears that most sites have had significant growth in year 2.

Depth to water in the plantation

1.2m.

Grazing

In July 2007 we put 210 Damara ewes into the brushwood plantation for 3 weeks. They did an excellent job at reducing the weed burden. The sheep might give the trees a nip to try it, but they don't like it and they don't eat it. You have to watch out for areas where they may camp: we lost about 30 trees where they were camped. Most importantly, don't let them run out of tucker. Rams tend to do a lot of damage to the trees, rubbing and breaking branches, so keep them out of your plantation.



Brushwood Project Site 9

Neil Smith of 'Clayton', Piawanning

Sudholz Road, Piawanning

Site description: Low lying sand over clay, with a good supply of water

Main farm location

6 km north on Sudholz Road, Piawanning.

Project site location

At the main farm, north-east of the sheds.

Soil type

Sand over gravel, clay in parts.

Date planted

15th August 2007.

Species planted

Melaleuca atroviridis (collected from Wubin).

Number of seedlings

2007: 20,000

2008: 35,000.

ABOVE:

Neil Smith of Clayton, Piawanning, amongst 20,000 seedlings planted for brushwood production.



MAIN PHOTO:

9 months after planting *Melaleuca atroviridis* growing quickly at this site near Piawanning.

INSET:

Melaleuca atroviridis in a sandy saline environment.

Density

4000 seedlings per hectare.

Site layout

The site has a layout of 4 rows, then a 4-5 m gap for vehicle access. This access track may be used for monitoring, spraying or fertilising. The distance between trees within the row is 1 m, with a distance between rows of 2 m.

Survival rate

Excellent survival, and good growth rate. The trees are performing well on the sandy soil.

The greatest weed burden at the site is from couch grass, though this has not affected their survival and it is hoped that the broombush will shade out the couch grass over the next few years.

Surprisingly, the broombush has had an equally good survival through a saline patch of the site, which was dominated by samphire.

Project report

Project ID: 05N116-04
Project Title: Brushwood Industry Development on Saline Land
Organisation: Moore Catchment Council
Address: PO Box 337, Moora 6510
Phone: (08) 9653 1355
Project Contact: Georgie Troup
Project Duration: Start date: 1st December 2005
Completion date: 30th September 2008



Project funds

This project has been funded by the National Action Plan for Salinity and Water Quality, an Australian Government Initiative. Other contributing funds have been received as in-kind investment from the landholders participating in this project. In-kind funds have included the labour required to plant the seedlings, fencing materials to protect plantations, site planting and maintenance activities. In-kind contributions have also come from the Moore Catchment Council for some administration costs and employment of the project staff.

Key achievements

The project has planted over 1.4 million seedlings for commercial purposes on land that is affected or at high risk of being affected by salinity. This has been achieved by the use of a subsidised seedling program which has provided seedlings to the landholder for 4 cents each. The landholders' contribution has been the fencing of the project site to exclude stock, site preparation and planting, and on-going maintenance of the plantation. Due to the poor seasons there has not been an adequate season for direct seeding.



Low rainfall during the tree planting season has restricted the opportunity to direct seed broombush. Another constraint to direct seeding has been the limited supply of seed. A bore monitoring program has been recording ground water levels in strategic plantations and at control sites from 28th September 2006.



Cross-regionally there are two groups working towards a Brushwood Industry Development Plan which will accurately determine the critical mass required to allow for a processing facility to be built within the region. With a survival rate of 80% of 1.4 million seedlings, and an average stocking density of 3500 stems per hectare, this produces an estimated 4.8 tonnes of brushwood per rotation (4–7 years). Current prices for quality brush are \$150–200/t, equivalent to ~\$800,000 resource for the region.



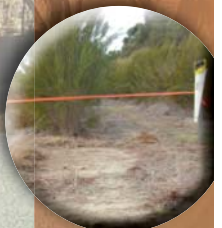
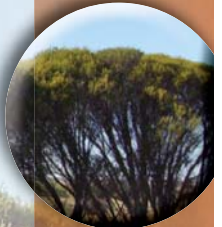
It is hoped that this project has helped to provide farmers with a legitimate commercial opportunity that also addresses some of the most serious environmental issues facing the region.

There has been acknowledgement of the successes of this project, and it is hoped there will be continued support for projects that have the ability to address both environmental and economic issues facing regional Western Australia.



Thank you to all the farmers that I have had the pleasure of working with over the past 3 years—may we continue to strive for the highest!

Georgie Troup
Project Officer



The Brushwood Industry Development on Saline Land project has been funded by the Australian Government, administered by the Northern Agricultural Catchments Council (NACC), and delivered by the sub-regional group, the Moore Catchment Council (MCC).

The project was developed in response to the growing need for some alternative, profitable land uses for land at risk of or currently suffering from salinity in the medium to low rainfall areas of the Wheatbelt.

This booklet is an extension tool that may encourage farmers across the Northern Agricultural Region to consider diversifying into brushwood by providing case studies from farmers across the region, covering an area from Calingiri to Morawa.

