The Moore Review Project

Reviewing sustainable agriculture projects facilitated by the Moore Catchment Council between 2006 –2016

Australian Government | National Landcare Programme

The Moore Catchment

Moora - Miling Pasture Improvement Group

Yarra Yarra Catchment Management Group

NACC Managing Natural Resources

This project was funded through the National Landcare Program, delivered by Moore Catchment Council and supported by Moora–Miling Pasture Improvement Group, Yarra Yarra Catchment Management Group and the Northern Agricultural Catchments Council.

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1.0 Introduction

Over the past ten years the Moore Catchment Council has been busy working with farmers to keep their land sustainable and productive by implementing projects to address issues including water erosion, wind erosion, salinity and water logging. These projects were designed to create greater productivity off the land and to encourage the diversity in markets within the wheat-belt. The aim of the Moore Review Project is to evaluate these projects and see what worked, what didn't work and why, and importantly to see what we have learned from the past ten years to improve future projects.

The Moore Review Project involved reviewing over 120 different projects, interviewing 80 farmers involved and photo point monitoring the sites. The projects that were reviewed included tree crop plantations (oil mallees and sandalwood), perennial pastures, saltbush, brushwood and strategic revegetation. Researchers, industry leaders, agronomists and farmers were all contacted to give new information of the way forward since the projects were originally run out.

Markets change, research advances and farmers needs alter over time hence this project was critical to find out what types of projects had longevity and what didn't. While all projects had an underlying environmental benefit, their major aim was to promote agricultural sustainability. It is important to find out the results of these projects to find the right direction for Moore Catchment projects in the future.

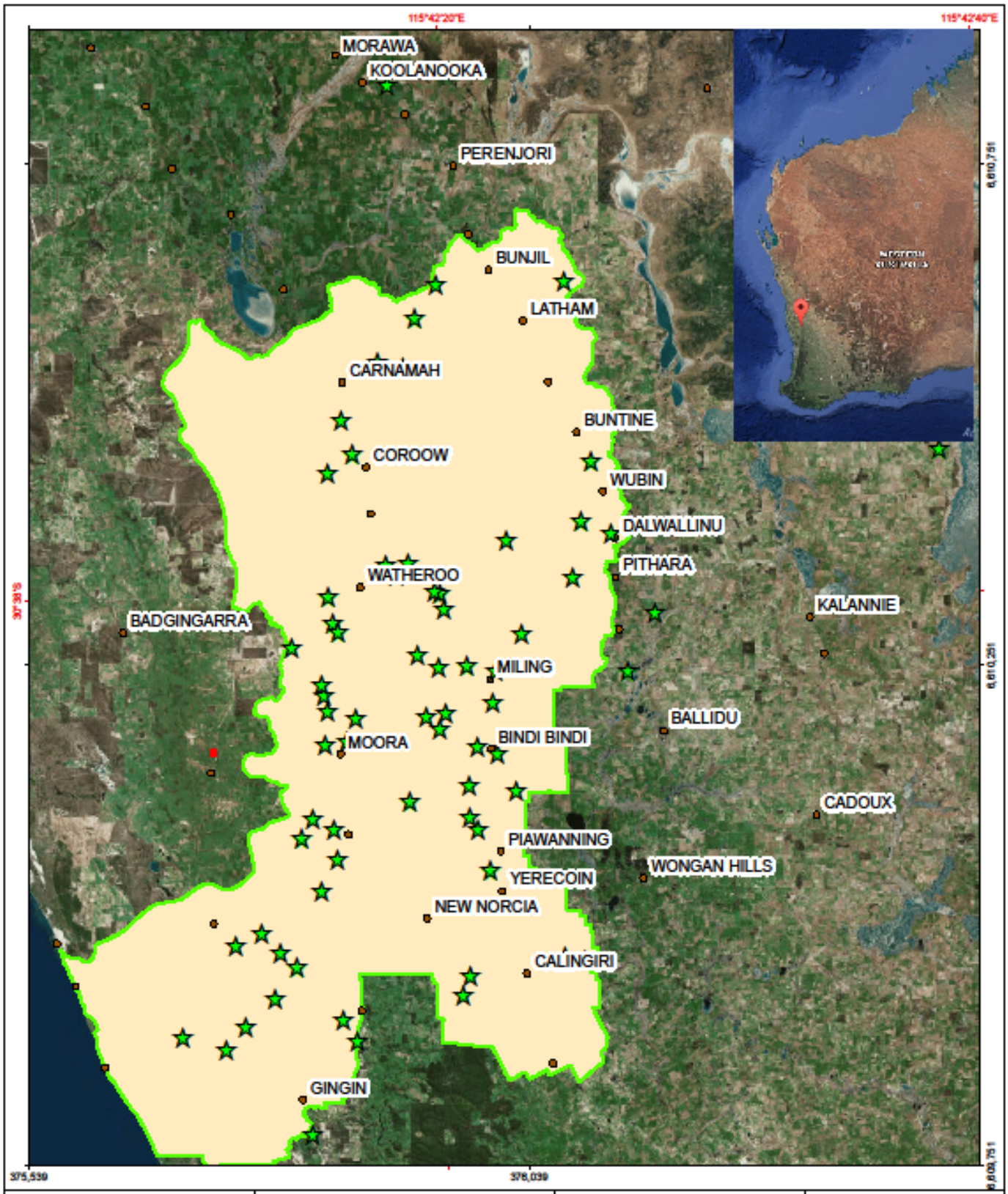
1.1 Key Findings

The response and feedback from farmers about these sustainable agriculture projects has been overwhelmingly positive. The farmers vary in needs across the Moore Catchment area depending on location and the type of farming system. The following points are the key findings concluded from the Moore Review Project:

- Saltbush has been one of the most successful project, creating productivity (as sheep fodder) where there was previously wasteland.
- The saltbush has also been successful in creating groundcover and protection to land that was otherwise bare and very susceptible to wind and water erosion.
- Perennial pasture projects have added a huge amount of productivity to sites where it germinated well. There has been mixed results in the success of germination particularly as the project was aimed at areas of non-wetting sands.
- Oil mallee projects had a mixed result of success, while the trees have grown and have provided protection from wind erosion they lack in providing extra farm productivity.
- The strategic revegetation sites have had great responses from the farmers involved. The sites have created wind breaks, created habitat and have aesthetically improved the landscape.

All farmers interviewed were positive about the outcomes of the projects and were interested in continuing to get involved with sustainable agriculture projects.

1.2 Map of project locations



2.0 Brushwood

2.1 Project overview

The Brushwood projects occurred over a span of three years, 2006—2009. The brushwood was planted under the project entitled 'The Brushwood Industry Development on Saline Land'. This project was funded by the Australian Government through NACC and included a offer to subsidise the purchase of brushwood seedlings to encourage farmers to diversify their farms production. The project focused on land that was under risk of increasing salinity in a medium to low rainfall area stretching from Calingiri to Morawa. The project was undertaken by 30 farmers throughout the project region. The brushwood species planted were *Melaleuca atroviridis, melaleuca hamata* and *melaleuca uncinanta.* Much of the brushwood in the area has been grown on ground that was unable to the cropped for reasons of conservation and biodiversity, water erosion, and salinity control.

An outlook onto the Bowman Brush plantation near Meckering

2.2 The Brushwood Market

During the years that the brushwood project was being rolled out the brushwood for fencing industry was promising to become a lucrative industry. The brushwood market has primarily been driven in WA by Bowman Brush, a plantation, manufacturer and fencing wholesaler. Bowman Brush were originally based in South Australia, however moved to WA once they acquired a brushwood plantation out of Meckering in 2012. This development in the WA industry has seen two farmers from the MCC brushwood project harvest and sell a brushwood crop. Bowman Brush will buy cut, weighed, and bundled brushwood for $0.5 per kilo of fresh weight.

Ian McGillivray hand cutting a brushwood plant with a machete

Harvesting the brushwood is done by hand with a machete. This method is preferred to get the best looking brushwood for the fencing panels and can be done quickly and safely if practiced. Once cut the brushwood is then placed on a cradle, tied up and the green weight is measured to report for payment. These bundles are preferred to be 25—30 Kilos for manual handling purposes.

Brett Bowman at the Bowman Brush factory inspecting a near complete panel being made.

A finished brushwood fencing panel at the Bowman Brush factory

Bowman Brush have identified that there is not enough demand within WA for brushwood fencing to require them to harvest extra brushwood off farmers properties. They are actively marketing and hope for a bigger break in the WA market soon. Bowman Brush have a plantation of 1,100 acres, which is enough to supply their demand at large.

The panels made by Bowman Brush range from sizes, with a maximum panel of 2.5m wide, by 2.1m in height. The products made by Bowman Brush include these panels, post rolls to put between the panels and roll tops to place on top of the fence to finish the look off. The brushwood used in these products needs to have a height of at least 1.2m, stem width no greater than 1.5cm (roughly the size of your thumb), and with minimal nuts. These requirements have meant that much of the brushwood grown in the MCC project are not quite big enough, even after ten years, due to low rainfall and saline ground.

A recent delivery of high quality brushwood from a farm near Narrogin

The fencing market is the primary use for the brushwood, however Bowman Brush are continually looking for more innovative markets to get use out of all types of brushwood, such as sand dune restoration. The brushwood is used either as rolls (to protect from waves), or as light sheeting to allow for the dunes to stabilise and grow vegetation with less stress from wind. Brushwood is also used in horse jumps. This brushwood must be fresh and is cut the day before equestrian events. Much of the brushwood for these jumps are not bought through marketable means.

Brushwood rolls made to use in dune rehabilitation

Recently made brushwood panels at the Bowman Brush factory.

2.3 Summary of Project

All farmers who have been involved in the brushwood project have been mostly satisfied with outcomes. Brushwood was primarily planted to reduce waterlogging and the increase of salinity at the majority of the sites. The attraction of selling brushwood as a cash crop was secondary. Only two farmers have harvested and sold the brushwood into the fencing market. The remaining farmers have been happy with the landcare outcomes of planting the brushwood and have only been moderately disappointed with the lack of market opportunities.

2.4 Recommendations

- If you currently grow brushwood on your property and are interested in harvesting in the future contact Bowman Brush.
- Don't grow Brushwood expecting a quick growing cash crop, you will need to invest approximately 10 years to grow it, particularly if growing on marginal land.
- Contact Bowman Brush or any other brushwood fencing company before planting your brushwood to ensure you are planting the correct variety in the correct way.

For more information on the brushwood fencing product contact Brett or Hayley Bowman at Bowman Brush on 0458251261 or 0427763793, or visit the website www.bowmanbrush.com.

2.5 Brushwood site inspections

Name: Debbie Collins **Site/farm Location:** Koolanooka

Project Type: Brushwood **Soil Type:** Loam

Project Year: 2006

Funding Body: National Action Plan

Project Overview: The brushwood plantation at the Collins' property was on a salty area where they had previously attempted growing salt bush and oil mallees. Both the salt bush and oil mallee plantings were not successful and hence when the opportunity to plant Brushwood came up they were very keen to see if that would work. The area planted was originally very productive cropping land however it turned salty within the last 35 years and has since been unusable. The Collins' have grown trees around the area to help to stop the spread of the salt, however are now diverting some energy into tyring deep drains through major water flow channels.

Having trialled other plants on the salty ground they were not sure how the Brushwood would go. The seedlings were planted with a tree planter with little issue. The survival rate of the trees was good, around >75%. The only areas that did not survive were on the fringes of the plantation on the eastern and western edges where the ground was too salty. The incentive to harvest and sell for brushwood fencing was not a major priority in the decision making to grow Brushwood.

What worked: Debbie was extremely happy with how the project went, particularly since no other project she had tried previously had survived on the salt. The Brushwood has aided immensely in halting some spread of the salt and has improved the area aesthetically. Having successfully grown the possibility of harvesting the brushwood in the future is attractive.

What didn't work and what would you do differently: Nothing about the project was a negative. Although the market for brushwood fencing has not taken off to be as big as once forecasted this was not the reason for the planting in that area and hence has not been a disappointment for the Collins'.

2017 site photographs: 4/5/2017

Name: Angela and Roger Dring **Site/farm Location:** Bunjil

Project Type: Brushwood **Soil Type:** SAND over gravel

Project Year: 2007

Funding Body: National Action Plan

Project Overview: The area planted to Brushwood on the Dring's property was apart of a salty creek. The are was bare prior to planting and the purpose of the project for them was to get something to grow that could withstand the salt. The reason for planting the trees here was to stop the increase of salinity into the adjoining arable paddock and also to mitigate some of the water erosion that occurs through the area after a heavy rain. Although the possibility of harvesting and selling made the project even more attractive this did not play a huge role in the decision to grow the Brushwood.

Roger and Angela planted the seedlings themselves using the local tree planter. The survival rate of the brushwood was approximately 70%, with the majority of losses on the sandier and saltier ground.

What worked: The planting of brushwood has helped to mitigate the increase of salt into the surrounding paddocks and further downstream by sucking up excess groundwater. This has also help minimise the amount of water erosion downstream by slowing the water flow after a heavy rain. The brushwood plantation has also helped invite native animals back to the area of the farm and has improved the landscape aesthetically.

What didn't work and what would you do differently: Due to the impact of the salt the plants are not growing as quickly they were first expected to when the project was rolled out—it was said to be approximately seven years of growth till being large enough to harvest, however ten years on and the plants are not quite at the required height. Another disappointment is that the brushwood fencing industry has not yet become as big as it was first said to become. This, along with the labour intensive harvesting method of cutting with a machete, makes the use the brushwood as a side industry unfeasible. However harvesting for the Dring's has never been their top priority or reason to plant the brushwood.

Site photographs: Taken 1/5/2017

Name: Fiona and David Falconer **Site/farm Location:** Coorow

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2006

Funding Body: National Action Plan

Project Overview: The brushwood here was targeted to be grown on bare, unused and relatively salty ground at the Falconers farm. The area had previously been cropped, however as it was low in the landscape it had become salty and no longer yielded enough to be viable. The incentive program was of interest to the Falconers as it would create a biodiverse vegetation corridor along the valley. Although the brushwood fence industry seemed attractive and added to the incentive of planting the shrubs it was not the deciding point to get involved.

The planting of the brushwood was successful with a survival rate of approximately 90%.

What worked: In the opinion of the Falconers planting the brushwood has been a great success as the trees are well adapted to survive in the area on the saltier ground where other plants would have struggled. The growth is impressive and the knowledge that there is a small industry for the brushwood is welcoming. Fiona is particularly pleased that the brushwood has allowed the soil to stabilise and form a crust, and in turn allow smaller native shrubs to begin to propagating. With this there is also increased numbers and biodiversity of native animals and birds. The improved aesthetics of the land has also been a major positive.

What didn't work and what would you do differently: If planted solely for economic gain then the brushwood would have been a disappointing project as the shrubs have been slow growing—particularly where the ground is a little saltier. Fiona would also have been welcome to more bore monitoring and checking of the plantations after the first few years, along with some updates on the progress of the brushwood fencing industry.

Site photographs: Taken 20/04/2017

Name: Max Hudson	**Site/farm Location:** Kalannie
Project Type: Brushwood	**Soil Type**: Loam
Project Year: 2006	**Funding Body:** National Action Plan

Project Overview: The area planted to Brushwood on Max Hudson's property is a natural waterway at the lowest section of surrounding landscape. The area was cropped very briefly after clearing however was left unused for years. The section that was planted connects up to a 60 km long vegetation corridor that runs across the landscape east to west from one lake system to another. The planting of brushwood was mainly put in to contribute and link up the corridor to create habitat and to ensure that this lowest part of the landscape did not get influenced and degraded by salinity in the years to come.

The actual planting of the brushwood went very well and the survival rate was >90%. The plants were planted in a pattern that could allow for future harvesting. The idea of harvesting and selling to the brushwood fencing market was an attraction to get involved with the project, however it was not the primary reason behind planting. As the brushwood is native to the area it was a preference as it was known that it would survive in the often harsh and dry conditions.

What worked: The brushwood project has been a success in the opinion of Max as it has increased biodiversity, contributes to the wildlife corridor across the landscape and has prevented any increase of salinity that may have occurred in the past ten years. The area is ideal to attract wildlife, particularly birds as there is increased habitat.

What didn't work and what would you do differently: The brushwood has not been harvested, it is still quite small as the rainfall isn't sufficient to allow it to grow to the ideal harvesting height. Max is not overly interested in harvesting the brushwood and he would have been interested in creating greater biodiversity by having a more diverse range of plants through the waterway.

Site photographs: Taken 26/04/2017

Name: Gene & Amanda Hannington

Site/farm Location: Coorow

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2007

Funding Body: National Action Plan

Project Overview: Gene and Amanda used the brushwood seedlings to plant within existing vegetation along the unused and degraded creek line that runs through their property. The creek had been left bare and semi cleared for years with areas impacted by increased salinity along it. The monetary incentive program allowed Gene and Amanda to go through with their plans of revegetating this creek line, and this would not have been done without it. The planting of the brushwood here was solely for the purpose of revegetation for environmental and aesthetic reasons as Gene and Amanda did not think that the brushwood harvesting and market would take off.

The planting of these brushwood went well using the local LCDC tree planter. They had a survival rate of >90%. The trees are growing nicely, however slowly due to being in a low rainfall area.

What worked: The brushwood trees have really improved the outlook onto the creek and create a more diverse wildlife corridor across the farm. The creek was impacted by salinity in parts and the planting of brushwood has now helped in preventing the spread of this. The brushwood has improved the aesthetics of the creek line hugely and has attracted Gene and Amanda to revegetate the remainder of the it.

What didn't work and what would you do differently: Gene and Amanda had no negative aspects of the project, for the use that they wanted the brushwood fro the project worked extremely well.

Site photographs: Taken 28/04/2017

Name: Charles Hyde **Site/farm Location:** Dalwallinu

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2006, 2007 & 2008

Funding Body: National Action Plan

Project Overview: There were three sites planted to brushwood over the three year period that the brushwood project was around for. The 2006 and 2008 sites were grazed in the past but were never cropped as the areas were too salty. The 2007 brushwood site was previously cropped and was not as salty as the two other sites. Charles planted brushwood in the three areas as they were not high performing areas for either cropping or grazing due to the salt issue. Primarily the brushwood was planted to reduce the water table and to mitigate any increasing salinity, the opportunity to try something different to diversify the farm was also attractive.

The planting of the brushwood at all three sites went well, however they each had differing survival and performance rates. The 2006 sites was, in hindsight, too salty to grow brushwood and many did not survive. Those that did had very slow growth rates. The 2008 site performed marginally better with a great survival rate, however again very slow growing trees due to the high salt concentration in the soil. The brushwood planted in 2007, on the better ground performed much better with greater survival rate and better growth rate, so much so that Charles was able to harvest and sell some in January 2017.

What worked: Charles has had many benefits out of planting the brushwood on his property. The main reason of planting was to reduce the water table and control the spread of salinity across the landscape. This has worked as Charles had hoped it would as the plants have survived on the marginally salty ground and are sucking up sufficient amounts of groundwater to stop more arable land turning salty. Charles has also been able to harvest his 2007 planted brushwood. Charles harvested and sold it to Bowman Brush in January of 2017. Charles received $0.05 per kilo of green weight.

What didn't work and what would you do differently: While the brushwood are doing their job at mitigating the spread of salt through the landscape Charles would have reduced the planting in the highly impacted salt area as these brushwood plants have been very slow growing. While Charles was able to harvest and sell some of his brushwood he said that the market was difficult to find, he had to investigate quite hard to find Bowman Brush as buyers. The method of harvesting was also very physical and time consuming and would be off-putting for other farmers. Hiring somebody else to do the cutting would cut the profits of selling the brushwood so much that it would almost not be worth harvesting.

Site photographs: Taken 28/04/2017

2007 planted brushwood

2008 planted Brushwood

Scales, binding string and cradle used during harvest

2006 planted Brushwood

Brushwood planted in 2007 and harvested in 2017

Name: Russel King **Site/farm Location:** Calingiri

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2008

Funding Body: National Action Plan

Project Overview: Russel planted the brushwood seedlings along a creek that runs through his property. Previously the creek had been grazed by sheep. He was worried that without planting something along the creek and fencing it off there would be a risk of an increase in salinity levels. By strategically planting the brushwood here Russel hoped that they would suck up any excess water and stop any increase in salinity.

The planting phase went well and there was approximately >90% survival rate. When deciding to plant brushwood Russel was more influenced by fact that they would grow successfully on marginally salty land and suck up excess water rather than the attraction of a possible market to sell into. As they are native plants that was an added bonus.

What worked: The project was a great success for Russel. Having the trees survive, grow and suck up water is exactly what he was after. Not only are they preventing any increase in salinity the brushwood have also increased the biodiversity of the area along the creek and have helped create a more dense wildlife corridor. Russel has also noted an increase in birds, particularly wrens throughout the area.

What didn't work and what would you do differently: There have been no negative aspects of the brushwood project. Although the market to buy brushwood for fencing has not quite taken off to be as big as first thought this has not worried Russel.

Site photographs: Taken 24/04/2017

Name: Emma & Shane Kelly

Site/farm Location: Gillingarra

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2008

Funding Body: National Action Plan

Project Overview: Emma and Shane had areas of their Gillingarra property that were continually waterlogged. These areas have been generally around the edges of the paddocks and they had not been able to crop them. They were keen to get something growing in these waterlogged areas when the brushwood project was available. Brushwood was an attractive choice for them to plant as it was native and the possibility of harvesting and selling for fencing was an intriguing development. In case of numerous bad years on the farm Emma said that having something growing that could possibly provide some income was a good backup.

When planting they were unsure of how the brushwood would go and had no high expectations. Some of the seedlings did not survive, particularly those that were planted in the very wet areas. Overall >80% of the planted seedlings survived. The plants are growing quite efficiently due to the abundant water supply. In hindsight Emma would have planted more brushwood, particularly in areas that are marginally impacted by salinity.

What worked: The brushwood seedlings have grown extremely well into mature plants. The areas they were planted in have become significantly drier and they are great cover and edging to have around the paddock. The added bonus of the brushwood are that they are native and improve the areas biodiversity and have attracted back vast amounts of birdlife. Some areas have been accidentally burnt, however they come back very well and healthily from this too.

What didn't work and what would you do differently: Emma would have been interested in further support and information on the brushwood fencing market and would have been interested to get contacts within the industry to find more out about harvesting and selling.

Site photographs: Taken 5/05/2017

Name: Barry & Margaret Johnson

Site/farm Location: Yerecoin

Project Type: Brushwood **Soil Type**: Sand & Loam

Project Year: 2006

Funding Body: National Action Plan

Project Overview: Waterlogging was a big issue in the area where brushwood was planted at the Johnsons Yerecoin farm. Barry rarely cropped the area that they were planted in however did graze it before planting to brushwood. After realising the area was too waterlogged and couldn't grow a worthwhile crop Barry was interested in planting something on it to suck up the excess water and bring back some natural habitat. Barry also had an area planted to brushwood at his property at Gabalong for a similar reason.

The survival rate of brushwood plants was good at both sites at approximately 75—80% . The trees planted were the *Melaleuca uncinata* variety from NSW, however were apparently suited to the soil type of the area they were planted. The brushwood was planted in a design so that future harvesting could be possible.

What worked: The brushwood plants were successful in that they grew well and soaked up the excess water. They did begin getting lower rainfall in the years to follow however so Barry is not sure if the lowered water table is in fact a direct link to the brushwood or the decreased rainfall. Even so he is happy to have vegetation covering the landscape.

What didn't work and what would you do differently: Barry was disappointed with the brushwood fencing market. He would have been interested to see the market take off a little more than it has done. He also would have preferred to have planted native Western Australian varieties of brushwood rather than varieties from NSW.

Site photographs: Taken 19/04/2017

A distant view of the brushwood plantation at the Gabalong property

Name: Jo Kohlen **Site/farm Location:** Moora

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2007

Funding Body: National Action Plan

Project Overview: The 20 ha area Jo planted to brushwood was historically cropped and grazed. The area would often get waterlogged and some parts was to high in salt concentration to yield a good crop. Jo realised that cropping wouldn't be overly productive on this area so he wanted to grow something that would reduce the waterlogging and be able to survive in moderate salinity. Jo had a good survival rate of the brushwood at approximately 75%. The seedlings planted closer to the higher salt impacted area had lower survival rates, those that did survive had relatively stunted growth.

Jo hoped that by planting the brushwood he would get good cover over the land and that this cover would help in lowering the water table.

What worked: The project was very successful in addressing the issues Jo wanted to address. The brushwood are sucking up the groundwater and reducing the waterlogging in the area. The brushwood have also increased the biodiversity of the area, attract wildlife and have transformed the land aesthetically.

What didn't work and what would you do differently: The were no negatives from the project in Jo's opinion. He never planted the brushwood to get into the harvesting for fencing market.

Site photographs: Taken 18/04/2017

Name: Graeme Lehmann **Site/farm Location:** Pithara

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2007

Funding Body: National Action Plan

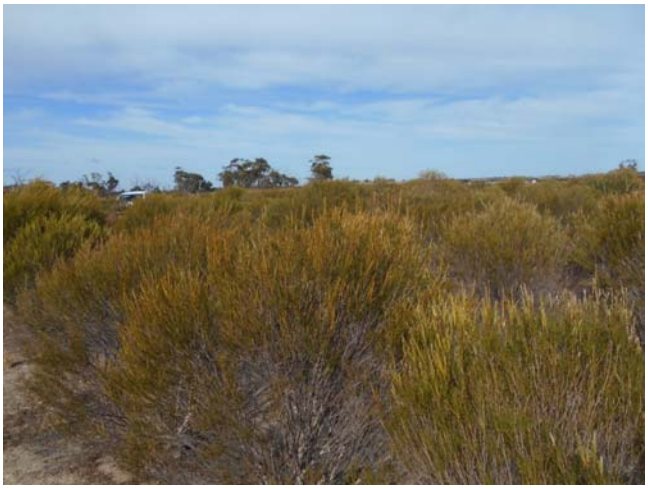
Project Overview: Graeme planted this area to brushwood as it is low in the landscape and was getting waterlogged. The water running off this area was flowing into the bushland further down gradient which was starting to look sick from the impacts of increasing salinity and waterlogging. Graeme was worried that without revegetating the area a little further up the hill then a greater problem with salinity would occur down gradient and the bushland would get into a worse condition. The section that was planted to brushwood was previously cropped however never produced great yields due to the waterlogging and to it being slightly saline.

The planting of the brushwood seedlings went very well and Graeme notes a survival rate of approximately 95%. He hoped by planting brushwood here the health of the bush further down gradient would improve by intercepting the water flowing down.

What worked: Graeme is pleased with the brushwood plants, he is happy that they are growing on the land as otherwise it would be bare and unused. The bush down gradient is still not in great health, however he does not think it has been getting any worse or saltier. He is unsure as to if this is due to planting the brushwood, or if it a result of lower rainfall in the past ten years.

What didn't work and what would you do differently: The only negative is that the plants are growing slower than Graeme expected they would. This is not a huge worry to him though as he has no desire to harvest the plants and sell on for fencing.

Site photographs: Taken 21/04/2017



Name: Jack & Darren Keeffe **Site/farm Location:** Watheroo

Project Type: Brushwood **Soil Type**: Loam

Project Year: 2006

Funding Body: National Action Plan

Project Overview: Jack and Darren got involved with the brushwood project as they had an area of their farm that they never cropped due to the high salinity concentration. The area was used for grazing before it was planted to brushwood. They thought that by planting it to brushwood they could reduce the risk of the salinity spreading by sucking up water and lowering the water table. The prospect of harvesting and selling for brushwood fencing was attractive for them as they could then increase the economic productivity of that land.

Out of the brushwood seedlings that were planting between 70—90% survived across the area. Although the shrubs have survived they have not grown to the height that was first expected the brushwood would grow to.

What worked: The brushwood have been successful in that they have halted the spread of salt further into the arable land. The brushwood are also good in providing shade for sheep when they use the paddock for grazing. They have found that this paddock is particularly useful for lambing due to the amount of protection that the sheep get from the shrubs.

What didn't work and what would you do differently: The fact that the brushwood have not grown to the height that was expected by now has been a little disappointing for Jack and Darren. Although harvesting and selling for brushwood fencing was not a major reason for planting it was still an attractive aspect of it and not having brushwood big enough for harvesting is disappointing. If the main reason for planting the brushwood was for harvesting and selling they would have planted in a less salty area, however the brushwood is currently where they need it to stop further spread of salt.

Site photographs: 30/03/2017

Name: Noel Mills **Site/farm Location:** Dalwallinu

Project Type: Brushwood **Soil Type**: Average sand & Loam

Project Year: 2008

Funding Body: National Action Plan

Project Overview: Noel had big issues with waterlogging in this area of the property. The water table was very high and there was some increasing of the salt concentration in this area. The area is very low lying and receives run off from all the drains that have been constructed on the surrounding farms. By planting the brushwood he hoped that he could reduce the water table and mitigate the impact that the salt was beginning to have on the area. Noel was not attracted to the project for the harvesting and selling brushwood for the construction of fences, however the seedlings were still planted in the design to allow for easy harvesting.

The specific area planted did previously get cropped however never yielded great. The brushwood planting went very well, except for in areas where the ground was just too wet and salty. The overall survival rate of the brushwood was great at >90%. Overall Noel put in approximately 100, 000 brushwood seedlings.

What worked: Since the planting of the brushwood the water table has been reduced significantly. This has resulted in stopping any further spread of salt out into the arable cropping land surrounding the brushwood. Since this is the sole reason that Noel planted the shrubs he thinks the project was very successful.

What didn't work and what would you do differently: According to Noel there were no negative points of the project. He mentioned that some of the brushwood plants are growing very slowly, however this is just due to the difficult salty conditions that they are growing in.

Site photographs: Taken 4/04/2017

Name: Ian McGillivray **Site/farm Location:** Koojan

Project Type: Brushwood **Soil Type**: average sand & Loam

Project Year: 2008

Funding Body: National Action Plan

Video interview link: https://youtu.be/9ZFDLUPC-RU

Project Overview: Ian got involved with the brushwood project as he had this area of land that he did not use along the river. The area is semi-cleared and therefore has never been cropped but he does run sheep through it. Ian was interested in growing something in this area that could produce a possible cash crop as it was otherwise unused. Ian thought that if he could get the brushwood growing successfully on the ground it would add to the productivity of the farm. Because of the calculated low profit of the brushwood he strategically planted it within a time frame so that his children would be in university when it came time to harvest and they could reap the profits. This, he thought, would provide them with a small income after the harvest and cost him nothing.

The planting of the brushwood seedlings went well, however the survival rate differed across the area as he planted different varieties in different areas depending on the soil type. The brushwood on the loamy soil struggled and had a lower survival rate than in the sandy areas which he suspects is due to planting the wrong variety.

What worked: Ian has been happy with the brushwood project, they have grown very well where they did survive. He has also been able to harvest some of his brushwood plants in the last year and has sold this material onto to Bowman Brush. He is also happy with the increase in biodiversity that the brushwood plants provide amongst the semi-cleared area.

What didn't work and what would you do differently: Ian was disappointed that the wrong type of brushwood was put onto some of the area, the loamy soil was not suited to the variety planted there. He has realised that the brushwood often need good free draining soils to be able to grow very successfully. Although Ian has managed to harvest some of his plants he said that the development of the market has not come to what was expected when the project was being rolled out between.

Site photographs: Taken 31/03/2017

Previously harvested brushwood growing back

A good stand of brushwood

Brushwood plants on the loamy soil that have not had great growth

A cutting demonstration by Ian

Name: Lyn & Bruce Ovens **Site/farm Location:** Coorow

Project Type: Brushwood **Soil Type**: Clay

Project Year: 2006

Funding Body: National Action Plan

Project Overview: Having turned too salty to grow a good crop the area that Lyn and Barry planted to brushwood had been unused for a long time. In the past they had done a lot of tree planting in surrounding areas and had always been interested in getting something growing on this ground. When the incentive program came up they decided to try it, they were not overly interested in harvesting the plants and selling the brushwood for fencing.

They had no plants survive in the first year of planting, and were worried the soil type was wrong. They were assured that the area could grow the shrubs so they re-planted some seedlings the following year. They had a better survival rate however it was still low at approximately 50%. The brushwood plants have not grown very big.

What worked: They were pleased that some seedlings survived after the second round of planting. They are glad they now have something growing on the salty ground as it makes the area more aesthetically pleasing. Those that have grown have grown slowly, however continue to survive and seem healthy.

What didn't work and what would you do differently: The biggest negative of this project was the low survival rate of the brushwood. Lyn thought that they may have been given the wrong variety of brushwood for their clayey soils and in future would put the brushwood in a different area. She would consider growing a salt tolerant plant more suited to heavy clay soils in this area in the future.

Site photographs: Taken 20/04/2017

Name: Cathy Cooke **Site/farm Location:** Koorda

Project Type: Brushwood **Soil Type:** Loam

Project Year: 2007

Funding Body: National Action Plan

Project Overview: Cathy decided to get involved in the brushwood project to diversify the income on the farm. She had previously sold brushwood to make fencing and when this opportunity came up she was keen to try it. The area that was planted to brushwood was previously cropped, it was in a more difficult area for the large machinery to get to and was less productive than the rest of the paddock. They decided to try the brushwood here as they had success selling it previously. Cathy had a plan to keep planting blocks of brushwood every few years and have a decent plantation for selling for fencing.

The Cooke's sold this block of the farm very soon after planting and therefore have not used the plantation or seen it since planting. Cathy suspects the plants would still be too small for harvesting due to the low rainfall in the area.

What worked: Although they have sold the property and are unsure if the plantation has survived or grown well Cathy thought it could have been a success in attempting to open up markets in the wheatbelt.

What didn't work and what would you do differently: There was nothing negative that Cathy could say about the project, however she does not know how well the plants performed or if the industry is worth getting into.

Site Photographs:

There were no site photographs for this site as the farm had been sold by the original owners.

Name: Glenn Solomon **Site/farm Location:** Perenjori

Project Type: Brushwood **Soil Type:** Loam

Project Year: 2006

Funding Body: National Action Plan

Project Overview: There were 25, 000 brushwood seedlings planted on Glenn's property. The area planted had been impacted by salinity and was fenced off from the surrounding cropped area. The brushwood was planted to help to reduce the impact of the salt by sucking up excess water. Glenn did not have the intention to harvest as the first reason of planting. The survival rate was very low due to a very dry year during 2006. The seedlings were therefore not able to establish.

What worked: The brushwood had a very, very low survival rate and unfortunately did not fulfil the reason that they were initially planted. The few that did survive have continued to grow.

What didn't work and what would you do differently: Due to the season being very dry the seedlings did not have a very good survival rate. Glenn has since planted saltbush on this area which have survived and continued to grow well.

Site Photographs: None available due to poor establishment

Name: Nick Woods **Site/farm Location:** Calingiri

Project Type: Brushwood **Soil Type:** Loam

Project Year: 2007

Funding Body: National Action Plan

Project Overview: Nick planted over 25,000 brushwood seedlings. He targeted his plantation in an area of his farm that is low in the immediate surroundings and has a perched groundwater water channel running through it. The area had previously been cropped however would get too waterlogged due to this perched water table and the runoff from the surrounding landscape. The area would not produce a viable yield to continue cropping it. The perched water table provided relatively fresh water for Nick to use and he did not want this to go salty, hence he planted the trees to suck up this water before salt deposits increased due to evaporation . While this was the main reason for planting the outlook for the brushwood market was attractive, however did not weigh heavily on Nicks decision to plant brushwood. Nick was also keen to get brushwood planting along the valley to make it look better.

He had great a survival rate from all areas that he planted at approximately >85. The third year after he planted the brushwood he crash grazed it to promote healthier growth which worked very well. A small section of the trees (~5%) did not survive the grazing as the sheep chose to camp in the area they were planted.

What worked: The project has been very successful for Nick. The brushwood plants are effectively sucking up the excess water and reducing the increase in the salinity. Although the brushwood have not reversed any of the damage that occurred before they were planted they have been great at halting any further degradation.

What didn't work and what would you do differently: Nick had no negative feedback about the project. In hindsight he would have liked some more diversity in the area, however this can still be achieved.

Site Photographs:

Name: Hedley Falls | **Site/farm Location:** Pithara

Project Type: Brushwood | **Soil Type:** Red loam

Project Year: 2008 | **Funding Body:** National Action Plan

Project Overview: Hedley planted the brushwood seedlings on this area of his property to address the increasing salt concentration and waterlogging of the soil. The area had previously been very productive for cropping however had begun to get very wet and was increasing in salinity. He was initially interested in planting the brushwood after hearing from farmers in the surrounding area who had been involved with the project over the years.

The shrubs were planted by Hedley and he had a great survival rate of approximately >80%, with only the seedlings on the fringes of the plantation not surviving. The plantation has been grazed by sheep twice over the past nine years and has grown back well, however the shrubs have not grown very tall yet.

What worked: The shrubs have grown well and continue to grow (even after grazing) on the salt. Hedley has been happy that they have managed to survive on the salty ground creating ground cover and holding the salty area. The salt has not spread further, hence the brushwood are doing the job they were intended for. In the years to come as they grow bigger he may be interested in harvesting .

What didn't work and what would you do differently: Hedley had no negative feedback about the project.

Site Photographs: taken 30/05/2017

Name: Yvonne Marsden	**Site/farm Location:** Geraldton
Project Type: Brushwood	**Soil Type:** Average sand
Project Year: 2008	**Funding Body:** National Action Plan

Project Overview: Yvonne planted the brushwood on a bare area of the beginning of a creek line on her property that was previously been unused. She was interested in the project to help in creating a productive area for livestock. The brushwood was intended to act as protection for livestock, to stop water erosion and to build up the soil biology and health. Yvonne planted the brushwood in four consecutive rows leaving gap and then four more rows. This gap was large enough to plant oats as feed for the sheep. This design was to allow for a productive area for livestock with both feed and shelter.

Yvonne planted the brushwood on mounds and had a reasonable survival rate. She never intended to harvest the brushwood as she thought the industry would be too far away from her plantation.

What worked: Yvonne was happy with the shelter that the brushwood have supplied the livestock. Pairing them with the oats sown in-between the rows she is slowly building up the soil biological system. The brushwood have heled in create habitat for native fauna, have improved the look of the water way and have also helped reduce water erosion.

What didn't work and what would you do differently: If done again Yvonne would not have planted on the mounds. She would have planted using a scalping tree planter to enhance survival and growth by scraping away the top non-wetting layer of the soil.

Site Photographs: Taken 19/01/18

Name: Peter Syme **Site/farm Location:** Wubin

Project Type: Brushwood **Soil Type:** Sand & Loam

Project Year: 2006 & 2007

Funding Body: National Action Plan

Project Overview: The area that Peter planted to brushwood had previously been cropped and grazed. The area was at risk of increasing in salinity, having issues with an increasing water table. Peter wasn't sure how planting the brushwood would go and had no huge expectations of it. The possibility of the financial return via the brushwood fencing market was an attractive aspect to the project.

Peter planted the brushwood seedlings over two years, 2006 and 2007. The seedlings planted in 2006 did not have a high survival rate as the months following the plantings were very dry. The areas that had the worst survival rate in 2006 were re-planted in 2007. This was a much better year and the survival rate was approximately 80-90%.

What worked: Peter was happy after the seedlings planted in 2007 survived. They have done well to grow on the more salt impacted ground. Peter is mainly happy that there is now vegetation growing on previously bare ground. He is particularly happy that the brushwood are sucking up the excess water and helping in reducing the risk of salt spreading further across the landscape.

What didn't work and what would you do differently: The brushwood have been very slow growing, particularly on the more salty ground. Peter was disappointed that there was a very low survival rate in the first year of planting. If done again he would have mounded the ground to ensure this survival rate could have been higher. The slow take off of the brushwood market has also been disappointing as there was quite a hype about it in the years of the project.

Site Photographs: Taken 20/04/2017

Name: David Moore **Site/farm Location:** Miling

Project Type: Brushwood **Soil Type:** Sand & Loam

Project Year: 2007

Funding Body: National Action Plan

Project Overview: The brushwood was planted over a large area with 20, 000 seedlings planted. The brushwood has never been harvested.

What worked: Despite being grown on marginally salty ground the brushwood has established well with very substantial growth.

What didn't work and what would you do differently: NA

Site Photographs: Taken 6/10/2017

Name: Alex Keamy **Site/farm Location:** Watheroo

Project Type: Brushwood **Soil Type:** SAND

Project Year: 2006

Funding Body: National Action Plan

Project Overview: The Keamy's had a large area planted to 50, 000 brushwood seedlings. The area planted to the brushwood was targeted due to an increase in waterlogging. The area had been cropped in the past, however this was not viable since the Keamy's took over the land due to this waterlogging. The water is reasonably fresh and before the brushwood was planted was encroaching further into the cropped paddock. By planting the highly waterlogged area to brushwood the Keamy's hoped to stop the spreading of the waterlogging to keep as much arable land as possible. The brushwood planting went very well with high survival rates of >90%.

What worked: The brushwood have been very successful in sucking up the excess water and reducing the spread of the waterlogging further into the cropped paddock. The brushwood have grown very well in the area, due to an abundant amount of fresh water, and look to be at a good stage to harvest.

What didn't work and what would you do differently: Although the brushwood have done the intended job of sucking up the excess water there are a number of other things to take into account. The brushwood were planted in rows very close together and unlike the most of the other plantations involved in the project, were not planted with a wider row to fit a harvester down. This also increases the fire risk due to limited access through the plantation. Alex has seen that it will be necessary to thin out every few rows in the next few years to create access points. This dense planting has also limited the ability to run sheep through due to the difficulty of driving around it. In future better access should be implemented in the design of the plantation to allow for the area to have multiple uses, i.e. with pastures planted between rows to be able to run sheep through.

Site Photographs: Taken 12/10/2017

Name: Les Crane **Site/farm Location:** Gabalong

Project Type: Brushwood **Soil Type:** Sandy/Loam

Project Year: 2006

Funding Body: National Action Plan

Video interview link: https://youtu.be/DBKBSu4A-XU

Project Overview: Les Crane was interested in getting involved in the brushwood project to add productivity to an area of his farm that was previously cropped, however had lower productivity than other areas. The area was becoming marginally salty, with a salt creek to the west of the plantation. The brushwood had a very good take with >80% survival rate. Over the ten years since planting parts of the plantation are now ready to harvest.

What worked: The brushwood have had a good take over the area. Having the plantation up gradient from the salty area has intercepted excess water and minimised the spread of the salty area. The brushwood have also created a windbreak to hold the soil of the neighbouring paddock and minimise degradation.

What didn't work and what would you do differently: Les has been happy with the growth of the brushwood. One of the major attractions of planting brushwood for him was the possibility of harvesting and selling for brushwood fencing. He has been disappointed that the market has not advanced far enough and that a harvester has not been developed and used for harvesting. Cutting by hand does not seem worthwhile enough for him. Les would have liked better development of the market and better follow up on the plantations involved in the project.

Site Photographs: Taken 26/10/2017

3.0 Saltbush

3.1 Project overview

Saltbush projects have been undertaken throughout the Moore Catchment area over the period between 2007—2013. Over three separately funded projects and involved over 25 landholders. The projects have all been aimed within the drier, more saline area of the Moore Catchment where land has been harshly impacted by salt, rendering it unproductive.

The initial saltbush project was 'Creating Productive Saltbush Pastures on Saline Land'. This project ran between 2007—2008, funded federally through the National Action Plan, and aimed to improve the profitability and sustainability of farms within the Moora-Miling Pasture Improvement Group region by changing land management systems on saline land. This project involved 15 farmers from the Moora-Miling Pasture Improvement Group and encouraged, through communication, education, technical support and awareness raising activities, the planting of saltbush for sheep fodder.

A typical salt scald area in the Moore Catchment

The second project ran through the years of 2009—2011. This project was 'Productive Salt land Pastures to Combat Wind Erosion in the Eastern Moore River Catchment' and aimed at strategically planting saltbush along salt impacted, waterlogged and wind eroded areas. The project focused on the upper and eastern areas of the Moore Catchment where salt has a larger scale impact on the land. There were 20 farmers that got involved with this project with an overall planting of 176,100 seedlings over an area of 272.4ha.

The later saltbush project spaned over the years of 2011—2013. This project was funded through NACC by the Caring for our Country program. The aim of this project was to increase ground cover on saline site and the surrounding areas in order to minimise the amount of wind erosion. This was hoping to be done by either planting saltbush or fencing off around natural vegetation.

3.2 Why Saltbush?

Saltbush is an ideal fodder shrub to grow in the MCC area due to it's known capability to grow on salt impacted ground without needing large amounts of rainfall and it's palatability to livestock. Saltbush has high concentrations of crude protein and contains Vitamin E (which provides the sheep with greater resistance to worms) but has low amounts of energy and high concentrations of salt. The farmer must provide supplementary feed, such as lupins, barley or hay, and have plenty of fresh water nearby. Saltbush can provide huge relief from grazing pressure throughout the summer months or drought years.

Rhagodia saltbush

Targeting the planting of saltbush in salty and otherwise unproductive areas of the farm creates the opportunity to transform this land into highly productive grazing country. It can double as wind and water erosion control by providing ground cover and slowing down the flow of runoff after heavy rains to reduce the sediment load further downstream.

Three main varieties of saltbush were planted—Old man saltbush, river saltbush and rhagodia. The river and old man are the more palatable of the three and were the more widely planted varieties. River saltbush is better suited to waterlogged soil and old man is well adapted to withstand periods of drought.

Left: River saltbush

Right: Old Man saltbush

3.3 The Future for Saltbush

Anameeka saltbush at Chatfields Nursery

Hayley Norman from CSIRO has been leading research on saltbush as fodder shrubs for the past ten Years, beginning with the project 'Sustainable Grazing on Saline Lands'. Hayley's initial focus was on finding a way to rehabilitate the expanses of saline land around the wheatbelt. One of her main aims was getting a profitable benefit for farmers on this unused salty land. This initial research has since developed into looking at elite fodder varieties that would create the highest productivity off the land. 60, 000 old man saltbush plants were assessed and eventually 12 of the best cultivars were picked and trialled across 10 different sites in the wheatbelt. Out of these one was found as the best performing with high palatability and plant biomass. This was named Anameka saltbush.

Anameka saltbush is grown under licence at Chatfields Nursery. At present the saltbush is grown from individual cuttings and propagated at the nursery until ready for sale as seedlings. This requires more labour costs than growing from seed and has resulted in a higher cost of the seedling. the seedlings cost $0.75 compared to the lower price of $0.33 for a regular old man seedling grown from seed.

One of the Chatfields and CSIRO's saltbush trial plots in Tammin

The next step in for Anameka saltbush is creating a seed line to reduce costs of seedlings. Hayley is interested in comparing the productivity of the Anameka planted from seedlings to those grown from the new seed line. She hopes that the variability of the saltbush grown from the seed line won't be too far from the seedlings grown from cuttings.

One of the main factors that Hayley thinks is important to get saltbush used more by farmers is education. Educating the farmers on saltbush grazing methodology and on it's productivity and nutritional benefits is imperative for the future uptake of growing the fodder shrub.

3.4 Summary of Project

The saltbush projects have been very positively received by all farmers. It has been a great project for the farmers to add productivity to their unused marginally salty land and all spoken to had no major negative feedback about it. The saltbush requires little upkeep, grows easily with very minimal extra inputs and grows on the more harsh areas of the farm. Sites that had low survival rates planted their seedlings on land that was too salty. These low maintenance properties paired with the added productivity the saltbush has provided are what have made it such a positive project.

An Anameeka saltbush plant at Ian McGillivray's farm

3.5 Recommendations

- Don't plant the saltbush of ground that is too salty, instead plant it on the fringes on these areas to slowly improve the area.
- Maintain a good grazing system to ensure the shrubs don't get too woody.
- If you have saltbush planted use it! It is a valuable source of feed!

For more information on attaining Anameka saltbush contact Dustin (0427 371 075) or Lisa (0429 371 076) at Chatfields Nursery, or visit the website www.chatfields.com.au.

3.5 Saltbush site inspections

Name: Quentin Bricknell

Site/farm Location: North Miling

Project Type: Saltbush

Soil Type: Poor/average SAND

Project Year: Two Projects—2010 & 2011

Funding Body: 2010— Caring For Our Country.
2011— National Action Plan

Project Overview: Quentin planted the saltbush from the two projects on unused salty areas. By planting the saltbush Quentin hoped to improve the landscape and increase the grazing capacity of that unused land. There were two salt bush sites on Quentin's property with the 2010 site having a higher concentration of salt in the soil than the 2011 site. The seedlings were planted on mounded ground to improve survival rates. The 2010 site had a reasonably good survival rate of approximately >75% and the 2011 site had a slightly lower survival rate of approximately >65%. Both sites were planted to only old man salt-bush.

What worked: In Quentin's opinion the project was successful as it allowed for some coverage over land that would have otherwise been left bare and unused. He has had sheep grazing it form time to time. Some of the saltbush has begun to re-seed itself and Quentin is hoping that this will continue to occur over the two sites to naturally spread over time.

What didn't work and what would you do differently: Seedlings planted in the very sandy, salty ground did not survive. The economic return on the 2011 site in particular is slow due to the moderate survival rate and the slow growth on the salty ground. As sheep feed it is great, however isn't enough to reap large economic benefits.

2010 Site Photopoints:

16/11/2010

Photo 1

5/04/2017

16/11/2010

Photo 2

5/04/2017

16/11/2010

Photo 3

5/04/2017

2011 Site Photopoints:

**No before photo points

Taken on the 5/04/2017

Name: Phil Barrett-Lennard

Site/farm Location: Gingin

Project Type: Saltbush

Soil Type: Average white SAND, good red SAND, loam.

Project Year: 2011

Funding Body: 2010— Caring For Our Country.

Project Overview: Phil runs a cattle grazing property just north of Gingin and has had extensive experience with different perennial pastures. Saltbush was a different type of grazing venture for Phil. He planted the saltbush in this particular area due to a mild impact of salt in the soil. Saltbush was of interest to him from seeing it successfully used for grazing around the wheatbelt. The planting process included ripping the soil, spraying, then seeding some clover for extra feed, then planting the saltbush on mounds. The survival rate was >80% and growth in the first year was fantastic after some great rains after planting. Six years on some plants are beginning to struggle, particularly on the gutless white sand and where couch grass is taking over.

What worked: The saltbush thrived quickly in this higher rainfall area, in comparison to saltbush grown in the drier northern areas of the Moore Catchment. It has boosted the grazing potential of the paddock with year round feed. The cattle enjoy eating it and it allows for a different type of mix in the grazing system on the property. In comparison to the way sheep graze the salt bush the cattle don't eat it bare, hence it comes back quicker.

What didn't work and what would you do differently: While there have been no negatives from the actual project, some of the salt bush is struggling in the gutless white sands, and in particular where the couch grass is taking over. The remainder of the project worked very well.

Site Photopoints:

Photo Point 1

27/10/2011

Photo 1

5/5/2017

27/10/2011

Photo 2

5/5/2017

27/10/2011

Photo 3

5/5/2017

Photo Point 2

27/10/2011

Photo 4

5/5/2017

27/10/2011

Photo 5

5/5/2017

27/10/2011

Photo 6

5/5/2017

Name: Les Crane **Site/farm Location:** Bindi Bindi

Project Type: Saltbush **Soil Type:** Gravelly loam

Project Year: Two projects - 2009 & 2012

Funding Body: 2010—National Action Plan

2012 -Caring For Our Country.

Video interview link: https://youtu.be/DBKBSu4A-XU

Project Overview: Les runs a wheat and sheep farm and has planted Salt bush on his property to cover salty ground and to create increased grazing potential. Over the two projects Les planted some saltbush amongst oil mallees along a fence line where he had previously been cropping successfully. He did this to then create smaller paddocks to create a rotational grazing system on the farm, while still maintaining viability to crop the paddocks. The paddocks are broken into 200m widths with trees and saltbush planted along the diviing fence line to create a mixture of fodder and shade for sheep. Other areas of the salt bush plantings over the two years of the projects are on salty ground and were planted to create some productivity off this ground.

Both River and Old Man salt bush were planted on Les' property. The survival rate of the saltbush varied across the different areas. The seedlings amongst the oil mallees had an approximate survival rate of 90%, while the seedlings planted on the salty areas struggled, with a survival rate of approximately 30-40%.

What worked: The salt bush has been great fodder for the sheep, in particular has increased the productivity of the salty ground. Although the survival rate was low on the salt impacted land it has still added to its productivity as fodder and has created groundcover over the otherwise bare land.

What didn't work and what would you do differently: The survival of the slat bush on the salty land was disappointing. Les would have been interested in leaving the mounds for longer before planting the seedlings. This could have allowed for more salt to leach out and perhaps allow the seedlings to establish better.

2010 Site Photographs:

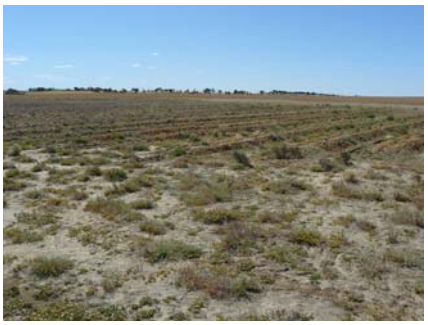


Photo 1

03/11/2010
(post-planting)

18/04/2017

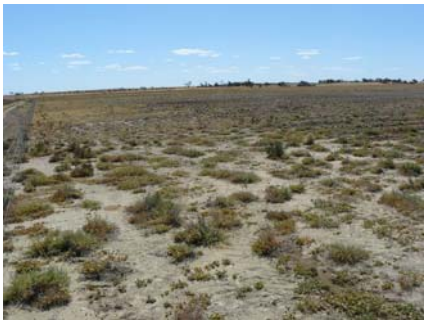


Photo 2

03/11/2010
(post-planting)

18/04/2017

2012 Site Photographs:

Photo Point 1

27/11/2012

Photo 1

18/04/2017

27/11/2012

Photo 2

18/04/2017

Photo Point 2

27/11/2012

Photo 3

18/04/2017

27/11/2012

Photo 4

18/04/2017

Name: Todd & Caroline Duggan **Site/farm Location:** Yerecoin

Project Type: Saltbush **Soil Type:** Loam

Project Year: 2012

Funding Body: Caring for our Country

Project Overview: Todd and Caroline got involved with the salt bush project to re-vegetate a salty creek line that runs through their property. The creek line was bare of any vegetation except samphire and suffered from wind erosion and water erosion. In the past the edges of the salt impacted area would have been cropped, however for many years these have been to salty for crop to survive.

The project involved fencing off around the creek line prior to planting to make sure the sheep would not get in before the seedlings established. Caroline and Todd planted the seedlings themselves and designed the project so that a mixed variety of native plants were put around the edges of the salt and saltbush was planted in the middle on the more marginal country. This was done to create more habitat, improve the aesthetics of the creek and to buffer the impact of salt in stages. The salt bush had a great survival rate, however there was limited survival in the areas that had a higher concentration of salt.

The area planted has been used for grazing approximately 2—3 times since planting as emergency feed in the summer months, however the main reason behind planting was to mitigate impacts of wind and water erosion, to transform the barren looking salt creek into a more aesthetically pleasing outlook and to bring back biodiversity to the land.

What worked: Caroline and Todd were very happy with the growth and survival of the salt bush. The impacts from the heavy rainfall has been minimised as the established saltbush plants have slowed the flow of water down the valley. Aesthetically the saltbush and the mixed revegetation has transformed the creek line. There has been an increased in birds and other wildlife return to the area and they are happy to have increased the biodiversity of the flora on their farm.

What didn't work and what would you do differently: There was no negative feedback from this project.

Site Photographs:

Photo Point 1

27/11/2012

Photo 1

25/05/2017

27/11/2012

Photo 2

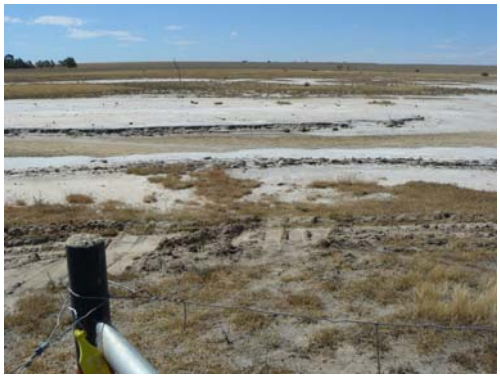
25/05/2017

Photo Point 2

27/11/2012

Photo 3

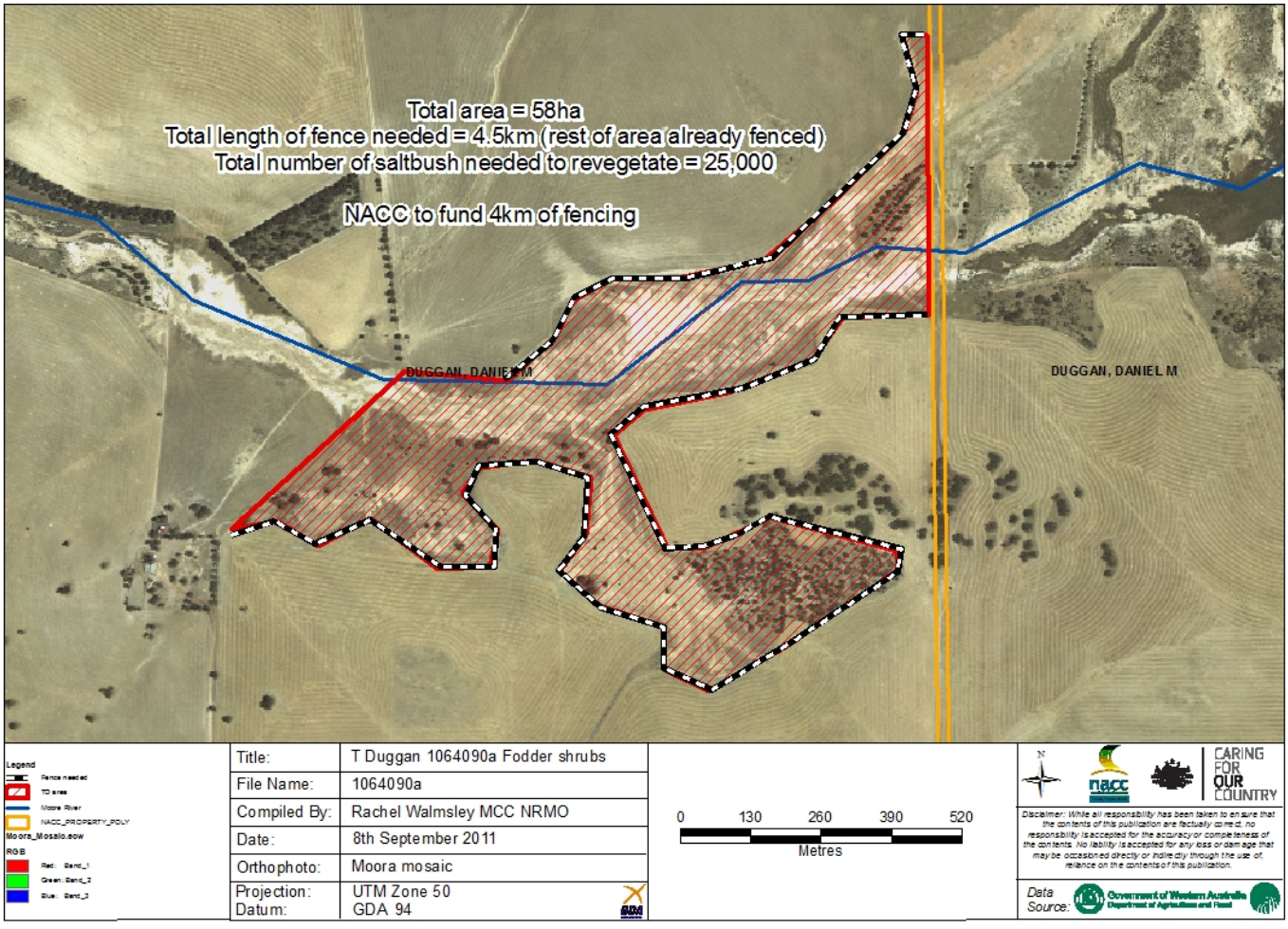
25/05/2017



27/11/2012

Photo 4

25/05/2017



Name: Noel & David Elliot **Site/farm Location:** Watheroo

Project Type: Saltbush **Soil Type:** Loam

Project Year: 2010

Funding Body: Caring For our Country

Project Overview: The area planted to saltbush by Noel was an area of the paddock that was too salty to yield a worthwhile crop. The area would get waterlogged in the winter months and was left as bare salty ground. 10,000 seedlings, a mixture of both old man and River salt bush, were planted on this 10 ha site. The Elliot's hoped that by planting salt bush on this unused ground they would get some increased productivity by grazing their sheep here. They were very keen as feed get particularly short during the summer months.

The area was planted without mounding and still had a very good survival rate of >80%. The only areas of difficulty were where the plants were on very sandy ground. The remainder of the salt bush plantings had great survival and growth are often used as sheep fodder.

What worked: The salt bush has transformed the unused salty land into highly productive ground as sheep fodder. The area is also not getting as waterlogged as it previously had been. The paddock now has extra value due to this productivity.

What didn't work and what would you do differently: The saltbush area was fenced off so that the adjoining paddock could be grazed without putting pressure on the salt bush in the first year. Since the establishment of the plants the fence has meant they the Elliot's are less likely to use the salt bush as they need to supplement the feed while the sheep are in there. Dave would have preferred not to have a fence around it so the sheep could graze the surrounding paddock and the saltbush together.

Site Photographs:

2/11/2010

Photo 1

13/4/2017

2/11/2010

Photo 2

13/4/2017

Name: Aaron Edmonds | **Site/farm Location:** Calingiri

Project Type: Saltbush | **Soil Type:** Loam

Project Year: 2011 | **Funding Body:** Caring For our Country

Project Overview: The area the Saltbush was planted was previously cropped however often proved too difficult as it constantly got water-logged. The saltbush was therefore planted here to create productivity while lowering the risk of waterlogging. Aaron then extended the plantings out to the salty creek line outside of the paddock. The area planted in the paddock was done in rows of three with space in between to allow for the possibility of sowing either pastures or a crop between. The salt bush on the salty creek was planted on mounds. This creek line area was not expected to survive very well, however the entire planted area had an approximate survival rate of >90%.

The two areas of salt bush are frequently grazed and therefore the salt bush is maintained at a good level for ongoing sheep feed. The design of the planting means that the need to supplement the feed is minimal, however in summer the feed between the rows does get short.

What worked: The success of the salt bush, particularly throughout the salt creek, has enabled profitability on the land without limiting it to cropping. The waterlogging in this area is less of an issue as it does not impact crop yields. Having the salt bush throughout the creek has meant that there is now added productivity where Aaron never thought there could be.

What didn't work and what would you do differently: Aaron had no negative feedback about the project.

Site Photographs:

Photo Point 1

23/03/2013

Photo 1

11/04/2017

23/03/2013

Photo 2

11/04/2017

Photo 3

23/03/2013

11/04/2017

Photo Point 2

Photo 4

23/03/2013

11/04/2017

Photo 5

23/03/2013

11/04/2017

Photo 6

23/03/2013

11/04/2017

Name: Phil Gardiner

Site/farm Location: Moora

Project Type: Saltbush

Soil Type: Loam

Project Year: 2008

Funding Body: Caring For our Country

Project Overview: The area that Phil had planted with salt bush had previously been seeded to clover and some perennials and had solely been used as a grazing paddock. The paddock is low lying and had become too salty and the clover and perennials struggled. The salt bush was a good option for Phil to put onto the paddock to continue to graze it and to suck up some of the extra water and possibly halt the increase in salt.

The planting of the salt bush went very well, with >85% of the plants surviving. The paddock was planted to old Man, raghodia and river saltbush, all are performing well.

What worked: The project ran very well for Phil, the mixture of river and old man salt bush has significantly boosted the productivity of the paddock. Additionally the salt bush has reduced the amount of salt scald throughout the paddock, and has drawn down the water table in the localised area. Since the planting of the salt bush some of the clover has come back as ground cover, adding further to the feed and productivity of the paddock.

What didn't work and what would you do differently: The project overall was very well done, however further guidance on the mixture of extra feed required for the sheep would have been helpful. With the paddock being planted solely to salt bush, Phil adds extra feed as roughage for the sheep, in hindsight he would have planted the salt bush with greater widths between the rows to then be able to sow some pastures in now that the paddock has a lesser extent of salt concentration.

Site Photographs:

27/11/2008

Photo 1

24/04/2017

27/11/2008

Photo 2

24/04/2017

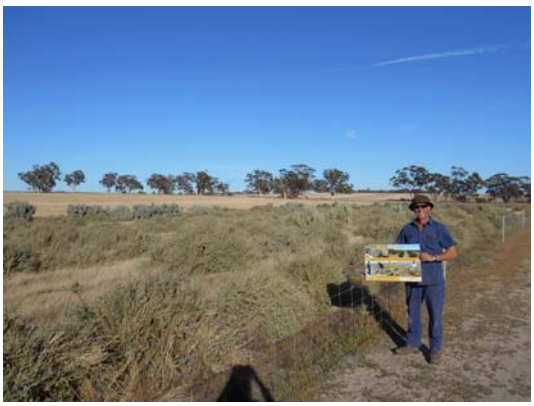
Name: David Glasfurd **Site/farm Location:** Moora

Project Type: Salt Bush **Soil Type:** Deep Loam

Project Year: 2012

Funding Body: Caring for our Country

Video interview link: https://youtu.be/dWn7euiGmx4



Project Overview: David has major runoff channels running through his property that were getting degraded from water erosion and waterlogging due to runoff from surrounding ridges. Parts of the saltbush site was cropped, particularly with barley or other pastures for sheep feed, however the land was getting far too wet and waterlogged. David therefore wanted to plant something here to create some ground cover, slow runoff and reduce waterlogging. Initially David wanted to plant the area to native revegetation however the saltbush incentive program was offered at the time and he thought he could also use it as sheep fodder.

Old man and River saltbush were both planted here, with great survival rates of both of approximately 80—90%. The area was fenced to separate from the larger paddock to allow the saltbush to establish well in the first year without pressures from sheep grazing.

What worked: The saltbush have had great survival rates since planting. The strategic planting of the saltbush has allowed for the excess water to be sucked up and gives a use and productivity of the waterlogged area. By fencing it off David allowed good establishment of the saltbush and now uses them for intermittent grazing in the dry months.

What didn't work and what would you do differently: Initially David would have preferred to have planted a mix of vegetation to get back biodiversity as well as enabling the reduction of the waterlogging in the paddock. He would still prefer to have a mix here but still appreciates the extra feed that the saltbush provides for his sheep. In the future he would combine native trees and saltbush.

Site Photographs:

Photo Point 1

8/10/2012

Photo 1

12/04/2017

8/10/2012

Photo 2

12/04/2017

Photo Point 2

8/10/2012

Photo 3

12/04/2017

8/10/2012

Photo 4

12/04/2017

Name: Richard Humphry **Site/farm Location:** Round hill

Project Type: Salt Bush **Soil Type:** Loam

Project Year: 2008 & 2011

Funding Body: 2008— National Action Plan

2010—Caring for our Country

Project Overview: Richard's farm is located within one of the main catchment streams flowing into the Moore River. He planted saltbush over two separate years, 2008 and 2010. The 2008 site was in an area that had previously been used for grazing and is on a floodplain. The 2010 site had been cropped by the previous owners but not by Richard. The 2010 site is between two forks of a Moore River tributary and often was impacted by water runoff and was too impracticable to crop. Richard wanted to plant the saltbush in these two areas to help in mitigation of flooding of the Moore River following heavy rains, to have groundcover to provide erosion protection after heavy rains, and to provide extra sheep feed in dry years.

Planting of the saltbush seedling went well in both years, despite a few issues with boggy ground, and both areas had survival rates of >90%. Due to the area they were planted in (good rainfall most years) they have survived and grown well. Richard does graze the salt bush as often as he needs to when feed in other areas of the farm is low.

What worked: Planting the saltbush in these two target areas has helped by lowering the water table and reducing excess runoff from heavy rainfall events. The saltbush has had huge impacts in terms of mitigation of flooding/minimising the amount of excess runoff flowing further downstream by significantly slowing down the flow rate through these two floodplain areas. Additionally the saltbush has been used very successfully as sheep feed, needed especially in the very dry years. Richard is very happy with the results of the saltbush project and believes it has been one of the best things he has done on his farm.

What didn't work and what would you do differently: Richard had no negative points about these two saltbush projects– he would be very keen to grow more saltbush around more of his salt impacted land.

2008 Site Photographs:

11/12/2008

Photo 1

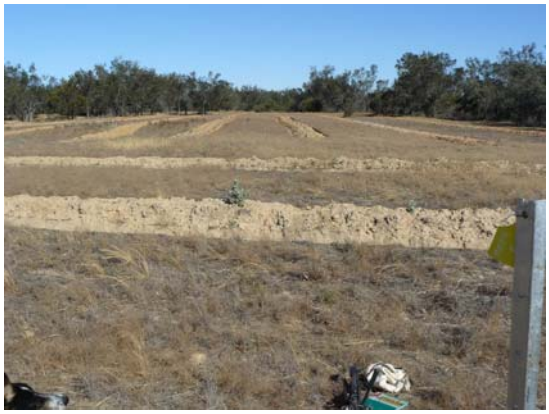
30/03/2017

11/12/2008

Photo 2

30/03/2017

2010 Site Photographs:



29/10/2010

Photo 3

30/03/2017

29/10/2010

Photo 4

30/03/2017

29/10/2010

Photo 5

30/03/2017

Name: Dan Hastie **Site/farm Location:** Nambam

Project Type: Salt Bush **Soil Type:** poor/average sand

Project Year: 2011

Funding Body: Caring for our Country

Project Overview: Dan ran cattle on this property and the area planted to saltbush had limited feed growing, particularly in the summer months. By planting to saltbush Dan hoped to increase the productivity of the paddock and boost the feed available either side of the winter months. The monetary incentive provided through MCC was a driving force to get the project done. The paddock planted to saltbush had previously been cropped until 2009, it was then solely used for cattle grazing. Dan put cattle on the paddock about every six months until the saltbush was eaten down.

The planting of the saltbush went well with 40, 00 seedlings planted. Out of these seedlings >90% survived. Old man and River saltbush varieties were planted, both surviving and growing well.

What worked: The saltbush survived, grew well and continued to grow well after it was eaten down by the cattle. The saltbush created extra windows for grazing the cattle as Dan could put the cattle in here during summer. At times Dan could get three separate grazing sessions out of it per year.

What didn't work and what would you do differently: There were no negatives about the project according to Dan. He would have been interested in putting in a more diverse range of species, focusing on the more palatable varieties.

Site Photographs:

Photo Point 1

17/10/2011

Photo 1

22/03/2017

17/10/2011

Photo 2

22/03/2017

Photo Point 2

17/10/2011

Photo 3

22/03/2017

17/10/2011

Photo 4

22/03/2017

17/10/2011

Photo 5

22/03/2017

Name: Geoff & Lizzie King **Site/farm Location:** Perenjori

Project Type: Salt Bush **Soil Type:** Loam

Project Year: 2012

Funding Body: Caring for our Country

Project Overview: Geoff and Lizzie run a wheat and sheep property out of Perenjori. The area where salt bush was planted was low in the landscape and was getting too wet and too salty to produce a good crop off. While they could still get germination and growth out of the crop they decided to sacrifice the worst performing area, and put it to saltbush. The saltbush was put there in the hope to stop any further spread of the salt and to still have some productivity off the area. The salt bush was planted without fencing off so that the sheep could get the roughage needed in their diet from the surrounding paddock.

The planting of the saltbush seedlings went well however the year was dry and it initially look as though there was not a good survival rate. But once left for a while the saltbush plants grew and had an overall survival rate to >75%. The only areas where the survival was limited was in patches where the ground was just too salty. Old man and River saltbush were both planted here.

What worked: The saltbush provides great grazing for the sheep when other feed is low. The sheep graze it frequently to keep it at a manageable size. The saltbush has also done a great job at surviving on the salty ground, sucking up excess water and limiting the spread of the salt.

What didn't work and what would you do differently: While the whole project was great in hindsight Lizzie would have extended the area that the saltbush was planted on further to cover even more of the marginally salty area. Lizzie would have also been interested in putting in more varieties of saltbush depending on their palatability.

Site Photographs:

31/10/2012

Photo 1

4/05/2017

31/10/2012

Photo 2

4/05/2017

31/10/2012

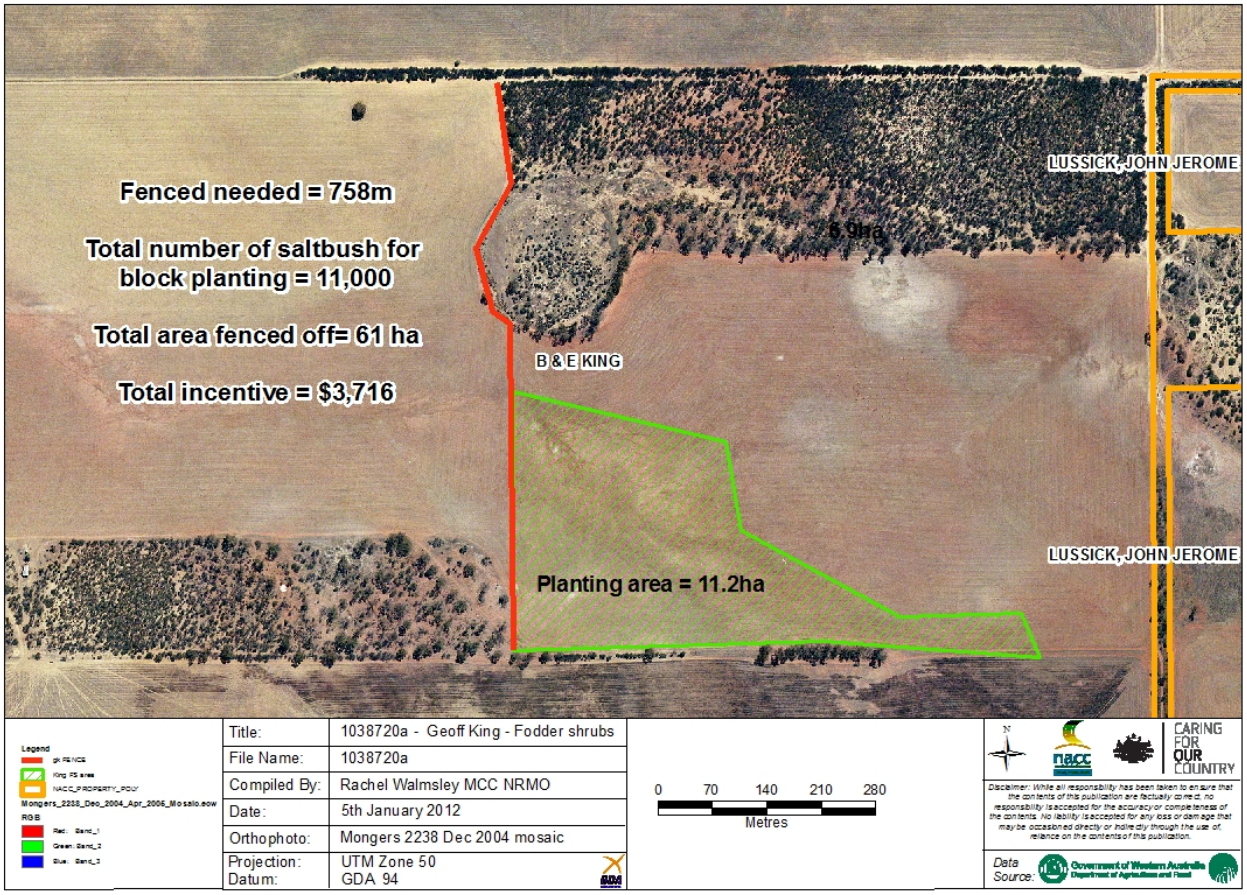
Photo 3

4/05/2017

31/10/2012

Photo 4

4/05/2017



Name: Graham & Hugh Johnson

Site/farm Location: Piawaning

Project Type: Saltbush

Soil Type: Deep Loam

Project Year: 2012

Funding Body: Caring for our Country

Project Overview: This area planted to saltbush was previously cropped by Hugh and Graham however was becoming more salty with time and was at times waterlogged. One section of the planted area was cornered off from the paddock and was a bit too difficult to get to with machinery. The area is in a low part of the landscape and was adjacent to remnant vegetation on a neighbouring farm. Graham and Hugh planted this area to a mix of salt bush and native vegetation in the hope that once the native seedlings were more mature they could use the area for grazing if needed while still creating a native vegetation and wildlife corridor. In planting in this strategic location they hoped to slow the spread of salinity and increase the biodiversity of the area.

Graham chose a strategic variety of native plants to plant amongst the saltbush to create a understorey, midstorey and canopy. They had a mixed result in terms of survival with less survival on areas of higher salt concentration. Overall they were satisfied with the survival in particular the saltbush had a very high survival rate. The years after planting were dry and this impacted the survival of the plants.

What worked: The saltbush project was a great success with huge survival rates. The saltbush creates a great understorey shrub amongst the native vegetation. The variety of species planted amongst the saltbush have also been a success by increasing the biodiversity on the farm and linking up the neighbouring bushland to create a bigger wildlife corridor. Once the plants mature this will attract even more native wildlife and birdlife back, will lower the water table further and will also provide emergency sheep feed in dry years.

What didn't work and what would you do differently: The only issue with the project was the timeline for getting the fencing up around the planted area. However they understand this was required to ensure protection of the seedlings from grazing.

Site Photographs:

Photo Point 1

21/03/2013

Photo 1

22/03/2017

21/03/2013

Photo 2

22/03/2017

21/03/2013

Photo 3

22/03/2017

Photo Point 2

21/03/2013

Photo 4

22/03/2017

21/03/2013

Photo 5

22/03/2017

21/03/2013

Photo 6

22/03/2017

Name: Darren & Jack Keeffe **Site/farm Location:** Watheroo

Project Type: Saltbush **Soil Type:** Deep Loam

Project Year: 2011 & 2012 (two sites)

Funding Body: Caring for our Country

Project Overview: Darren and Jack have a creek line running through their farm and before getting involved with these saltbush and fencing projects this creek was becoming degraded. They wanted to be able to fence off the creek to sheep and still be able to graze the surrounding paddock while being able to stabilise the banks by planting saltbush. The areas involved in the project were previously unused, apart from grazing. The project done in 2011 involved fencing and planting of saltbush. This project went well with a survival rate of >90% of the saltbush. This site is now lightly grazed when feed in other areas of the farm is low.

The 2012 site, also along the creek line, was also fenced however no saltbush was planted here. This was fenced off with the hope that more native vegetation would naturally regenerate as the sheep are kept off the ground. By keeping the sheep off both areas they hoped there would be minimal degradation of the creek and therefore reduce impacts downstream, particularly after a heavy rainfall event. They also hoped to create a healthier natural habitat for native wildlife.

What worked: Darren and Jack have had noticeable positive outcomes from the project with the creek system stabilising with reduced degradation. As the saltbush has grown successfully they now have economically profitable and environmentally healthy land. They do lightly graze the saltbush to keep it at a manageable level, particularly in the dry years when there is limited feed around the remainder of the farm. They are happy that the areas can now attract back native wildlife and also attract more native vegetation to revegetate.

What didn't work and what would you do differently: Darren and Jack have no negative feedback about this project, they are very happy with how it went.

2011 Site Photographs:

Photo Point 1

17/10/2011

Photo 1

30/03/2017

17/10/2011

Photo 2

30/03/2017

17/10/2011

Photo 3

30/03/2017

Photo Point 2

17/10/2011

Photo 4

30/03/2017

17/10/2011

Photo 5

30/03/2017

17/10/2011

Photo 6

30/03/2017

2012 Site Photographs:

Photo Point 1

01/05/12

Photo 7

30/03/2017

01/05/12

Photo 8

30/03/2017

Photo Point 2

01/05/12

Photo 9

30/03/2017

01/05/12

Photo 10

30/03/2017

Name: Ian Lehman

Site/farm Location: Bindi Bindi

Project Type: Saltbush

Soil Type: Salt lake/ loam

Project Year: 2010

Funding Body: Caring for our Country

Project Overview: The area that was planted to saltbush on the Lehman's farm is on the banks of the salt lake that has very limited ground cover. Ian was interested to improve the area aesthetically as it was just an area of salt scald. The area is an existing and natural salt lake, the salt is not spreading and Ian planted solely to get some ground cover to improve the outlook of the lake and to reduce any wind erosion that may occur. He expected to get some cover over this area however due to the very high concentration of salt the actual survival of the seedlings was very low.

They planted the saltbush themselves without mounding and had an overall survival rate of 30-40%. Planting was concentrated on the outskirts of the lake, however there were some lines planted towards the middle, and this is the area that had the most limited survival rate. While most of the seedlings did not survive those that did have already improved the outlook of the lake.

What worked: While the project had very low survival rates of the seedlings Ian is still happy that some on the fringes of the lake took off. These areas have a lower concentration of salt. This is reassuring for Ian as he now knows that he could plant more in this area. Ian has noted that in certain areas there has been an increase in the amount of bluebush growing around the lake since the saltbush was planted.

What didn't work and what would you do differently: The main negative about the project is the low survival rate due to the very high salt concentration. Ian thinks that this could have possibly been avoided if he had mounded this area to allow for the salt to leach out and give the seedlings a better chance to survive. He would also increase the planting of saltbush around the fringes of the lake where the salt is less severe.

Site Photographs:

10/11/2010

10/04/2017

25/03/2010

10/04/2017

Name: Jeremy Lefroy **Site/farm Location:** Roundhill

Project Type: Saltbush **Soil Type:** Loam

Project Year: 2008 & 2010 (two sites)

Funding Body: 2008—National Action Plan

2010—Caring for our Country

Project Overview: Jeremy had two sites planted to saltbush in the years 2008 and 2010. The 2008 site was planted in an area that had an been increasing in salinity, hence he wanted to stop this increase further. The 2010 site was targeted at stabilising and protecting the runoff channel/creek line during heavy rainfall events. This area was also relatively salty and hence saltbush was a good option to plant here. Jeremy was also hoping to increase the productivity of the areas and use them for grazing in summer months and dry years. Both sites had vey good survival rates of >90%.

What worked: The saltbush that was planted along the creek line have had great impacts on stabilising it with less wash outs occurring. The saltbush has provided a good supply of feed in the dry years and also provides great ground cover. The 2008 site has also benefited with the salt concentration remaining relatively stable and not increasing.

What didn't work and what would you do differently: There were no negatives about the project itself. Jeremy had the fence around the 2010 site wash away during a heavy rainfall and runoff event a few years previous. This caused the sheep to get in and heavily graze the plants, however they have recovered and are still growing well.

2008 Site Photographs:

11/12/2008

3/04/2017

Photo 1

11/12/2008

3/04/2017

Photo 2

2010 Site Photographs:

23/11/2010

Photo 3

3/04/2017

23/11/2010

Photo 4

3/04/2017

23/11/2010

Photo 5

3/04/2017

Name: Kristin Lefroy **Site/farm Location:** Roundhill

Project Type: Saltbush **Soil Type:** Loam

Project Year: 2008 & 2012 (two sites)

Funding Body: 2008—National Action Plan

2011—Caring for our Country

Project Overview: Kristen's farm is located on one of the major runoff channels of the Moore River running through Moora. He wanted to plant saltbush to add some groundcover and to slow down runoff flow to areas further downstream. The 2008 site was located around a creek line/runoff channel and had some minor issues with salinity. The area was historically grazed but never cropped. The 2011 site is also located along a runoff channel which has less impacts from salt. This was also never cropped, however was used for grazing.

By targeting these areas Kristin hoped to slow the runoff, provide ground cover to stabilise the soil and also increase the amount of feed for sheep. He had a very good survival rate at both sites of >90%.

What worked: As the saltbush had great survival rates and have grown well in the years since planting Kristin believes they have helped reduced the amount of erosion and runoff during heavy rain events. Because his property is located in a runoff channel this will help with future heavy rainfall events and hopefully reduce the risk of flooding. The saltbush have also provided extra feed for the sheep.

What didn't work and what would you do differently: Kristin has been disappointed with the palatability of the old man variety of saltbush as the sheep avoid it more than the river salt bush. The plants took a while to establish well and grow to a suitable size for grazing, particularly without mound before planting. If the project was offered again he would benefit more from having fencing included (as it wasn't done for his projects). This would allow for grazing of the paddock while the saltbush was still establishing. The areas planted to the saltbush have also had an increase in rye grass., an issue for Kristin if it spreads to the surrounding cropping paddocks.

2008 Site Photographs:

21/11/2008

Photo 1

3/04/2017

21/11/2008

Photo 2

3/04/2017

21/11/2008

Photo 3

3/04/2017

2011 Site Photographs:

Photo Point 1

19/04/2012

Photo 4

3/04/2017

19/04/2012

Photo 5

3/04/2017

Photo Point 2

19/04/2012

Photo 6

3/04/2017

19/04/2012

Photo 7

3/04/2017

19/04/2012

Photo 8

3/04/2017

Name: Phil Martin **Site/farm Location:** Watheroo

Project Type: Saltbush **Soil Type:** Poor/average sand

Project Year: 2011

Funding Body: Caring for our Country

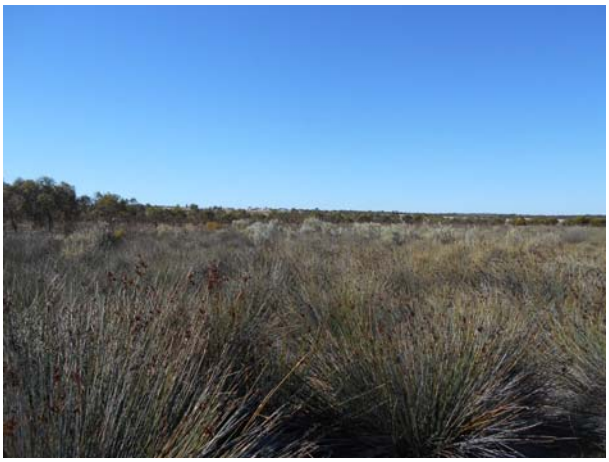
Project Overview: The Martin's had this area of salty unused ground that they wanted planted to saltbush. The saltbush was targeted in this area to provide some productivity in the form of sheep feed. The area was often wet and boggy and was only ever used for grazing before the planting of the saltbush seedlings.

They had a great survival rate of approximately 80-90% and hoped that the saltbush would continue to re-seed itself. They planted old man, river and rhagodia seedlings.

What worked: The survival rate was great and the saltbush continued to grow very well in the years to follow. The ground has been improved in terms of reducing waterlogging and the threat of the spread of salt has been addressed. The Martin's no longer run sheep on the property, however when they did the saltbush was great feed. The saltbush has stabilised the ground so much that they have had an increase of other plants coming in and growing over the scald areas.

What didn't work and what would you do differently: The Martins have an issue with Spiny Rush throughout the area planted to saltbush, in hindsight Phil would have done better sight preparation in spraying and burning out these weeds. He has also noticed that the sheep preferred to eat the river saltbush more than the old man and rhagodia. He would have planted more river and less of the other two varieties. Driving through the area has also become difficult with the mounds so he would have designed the rows with better access points. Otherwise the actual project has been a great asset to the farm.

Site Photographs: 7/04/2017



Name: Craig & David McLean | **Site/farm Location:** Watheroo

Project Type: Saltbush | **Soil Type:** Average sand

Project Year: 2010 | **Funding Body:** Caring For Our Country

Project Overview: Craig and David identified this area to be very poor for cropping as the concentration of salt was progressively increasing over time. Once they bought the property they never attempted to crop the area, however the previous owner had. They ideally wanted to plant the saltbush in this area to suck up any excess water that may cause the salt to spread out onto their arable land. They also hoped that the saltbush would boost the productivity of the area through grazing.

The saltbush seedlings had great survival rates of approximately >75% and have continued to grow.

What worked: The project has provided David and Craig with increased productivity off this salty area as they put sheep in the paddock or grazing every year. They have noticed that there is less salt scald over the area and in some areas the saltbush is naturally self-seeding.

What didn't work and what would you do differently: The area has problems with couch grass and having the saltbush planted so close to the fence makes it difficult to drive up the fence line to spray and control it before it before it moves into the neighbouring paddock. The only other issue with the project was the design of the rows and the trouble with chasing sheep across the paddock with the mounds. In hindsight Craig would have liked to have more saltbush planted in the area as it overall is a great plant for the space.

Site Photographs:

2/11/2010

Photo 1

7/04/2017

2/11/2010

Photo 2

7/04/2017

2/11/2010

Photo 2

7/04/2017

Name: Brad Millsteed

Site/farm Location: Watheroo

Project Type: Saltbush

Soil Type: Average sand

Project Year: 2010

Funding Body: Caring For Our Country

Project Overview: The 13ha area that Brad planted to saltbush was not able to be cropped as it was always too waterlogged. He did not want the land to go unused and thought planting it to saltbush would address the waterlogging and would also create a use for the area in terms of grazing it. Waterlogging is a widespread issue in the Watheroo drainage area.

Brad planted old man and river saltbush and had an average survival rate of <50% in the first year. He replanted more seedlings the following year to boost the area and had a greater survival rate of >90%.

What worked: After the second year of planting Brad had great survival rates and hence has good coverage over the waterlogged area. He believes the saltbush have stopped, or at least reduced, the waterlogging over this particular area. Brad grazes cattle and the saltbush has become a great input into his grazing capabilities.

What didn't work and what would you do differently: The only issue with the project was the lack of survival of the seedlings in the first year. However after re-planting the following year there have been no negative aspects to the project.

Site Photographs:

2/12/2010

Photo 1

7/04/2017

2/12/2010

Photo 2

7/04/2017

2/12/2010

Photo 3

7/04/2017

Name: Ian McGillivray | **Site/farm Location:** Koojan

Project Type: Saltbush | **Soil Type:** Poor sand

Project Year: 2010 | **Funding Body:** Caring For Our Country

Project Overview: Ian planted this area to saltbush as he was not getting successful crops off the land due it's poor soil characteristics. He did previously try to crop it but decided to plant it to saltbush instead to provide productivity primarily through grazing. He was not sure what to expect from planting the saltbush here as he was aware of the very poor soil conditions.

He had river saltbush planted here and initially the project went well with a great survival rate across the area. After the first six months of growing however the majority of the saltbush plants died. Those that survived continued to grow but have never taken off and have never grown very big.

What worked: Little about this project was successful. The majority of the plants died however some did survive. These survivors have been very limited in their growth. Ian has taken the project as a success in knowing that this type of poor sand does not accommodate growing saltbush.

What didn't work and what would you do differently: Mainly, what did not work about this project is that the saltbush did not survive. If the opportunity came again Ian would plant the seedlings on a different soil type or would plough and clay the paddock first.

Site Photographs:

29/9/2011

Photo 1

31/03/2017

29/9/2011

Photo 2

31/03/2017

29/9/2011

Photo 3

31/03/2017

Name: Michael O'Callaghan **Site/farm Location:** Marchagee

Project Type: Saltbush **Soil Type:** Deep loam

Project Year: 2012 **Funding Body:** Caring For Our Country

Project Overview: Michael previously cropped the area that he planted to saltbush however it was getting too waterlogged and he was not getting enough profit out of the crop to keep it viable. The area is in a low lying section of the property adjacent to a drain that is also trying to reduce waterlogging around the property. He decided to plant it to saltbush as the area was also marginally salty and he needed groundcover to soak up the excess water and prevent future wind erosion. He did not want the salinity and waterlogging to encroach on his adjacent arable land. He does not run sheep so the grazing productivity was not an influence for him. The saltbush had a fantastic survival rate.

What worked: Michael was very happy with the outcome of the project. He had great survival rates and the waterlogged area is now covered. The saltbush may become useful in the future as they do agist sheep sometimes. Michael is pleased that the salinity in this area has not spread and hopes the saltbush will keep the area stabilised.

What didn't work and what would you do differently: There was no negative feedback on this project form Michael.

Site Photographs:

14/12/2012

Photo 1

13/04/2017

14/12/2012

Photo 2

13/04/2017

Name: Neil Pearse **Site/farm Location:** Miling

Project Type: Saltbush **Soil Type:** Shallow loam

Project Year: 2008 & 2010

Funding Body: 2008—National Action Plan

2010—Caring For our Country

Video interview link: https://youtu.be/DBKBSu4A-XU

Project Overview: Neil has a large area of salty creek line/runoff channel through his property. The two saltbush projects were done in two different sections of this channel. The earlier project in 2008 was done in an area that was unused with a high concentration of salt. The salt in the western area of this site had previously begun to encroach further on some of the adjacent cropped paddock. Neil was keen to get something growing to minimise the risk of further salt spread and loss of productivity. The 2010 site was done in a similar manner. The two sites were predominantly planted to provide Neil with something relatively useful, in terms of potential grazing, on otherwise useless land.

Both sites were mounded before planting due to the high salt concentration and were planted to old man and river saltbush. There was a great survival rate of approximately >80% in the years following planting, however in recent years some of the saltbush have begun to die.

What worked: Neil was very happy with the project as he was not sure so many would survive on the highly saline land. The saltbush have created productivity in areas that were previously useless. Neil has grazed the saltbush in dry years, however it is not in his primary grazing rotation. He has been happy to see that some plants are self-seeding between the rows. The two projects were very successful for Neil.

What didn't work and what would you do differently: Although very successful the only negative to the project is that the mounds have made chasing the sheep through it quite difficult. In hindsight he would have had the rows designed in a way that could allow for easier access for vehicles. If he were to do the project again he would plant more saltbush, originally he did not as he thought the larger area was too salty.

Site Photographs:

2008

27/11/2008

Photo 1

5/04/2017

27/11/2008

Photo 2

5/04/2017

27/11/2008

Photo 3

5/04/2017

2010 Site Photographs:

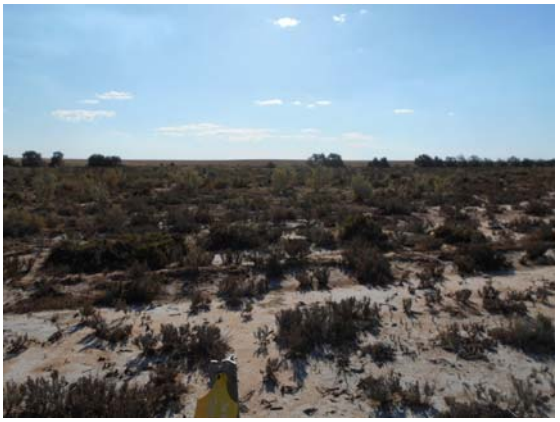
27/11/2008

Photo 4

5/04/2017

27/11/2008

Photo 5



5/04/2017

27/11/2008

Photo 6

5/04/2017

Name: Brendon Pratt **Site/farm Location:** Miling

Project Type: Saltbush **Soil Type:** Shallow loam

Project Year: 2008 & 2011

Funding Body: 2008—National Action Plan

2011—Caring For our Country

Project Overview: The Pratts were involved in two saltbush projects as they wanted to create some productivity off the otherwise unused land. The site where the 2008 project was done was previously used for grazing, with the fringes of it previously cropped. The 2011 site was purely grazing land. The areas are saline and there was risk of this salinity encroaching on the adjacent arable land. The two areas were also prone do wind and water erosion when the ground was bare, in particular water erosion as they are in main runoff channels. By planting saltbush it was hoped that the impact from erosion would be reduced and the risk of increasing salinity would be mitigated. The saltbush was also hoped to be added into the mix of grazing, particularly in the dry years.

Old man, rhagodia and river saltbush were planted at both sites and both had very good survival rates of approximately 90%.

What worked: According to Brendon both sites were very successful for addressing the issues that were arising in the two areas. The saltbush provides good feed for the sheep, adding productivity to land that was previously unused. The two areas have also benefited from reduced erosion, particularly water erosion at the site planted in 2008. Brendon is also happy to see that the saltbush is self-seeding.

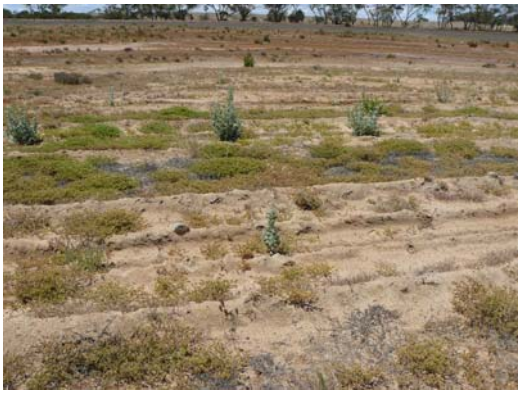
What didn't work and what would you do differently: The only issue from the project was that the rhagodia variety of saltbush was much less palatable to the sheep and therefore less useful to plant. Brendon would be keen to have increased the diversity of the saltbush planted and add in more palatable varieties of saltbush or other types of fodder shrubs.

2008 Site Photographs:

27/11/2008

Photo 1

28/03/2017



27/11/2008

Photo 2

28/03/2017

27/11/2008

Photo 3

28/03/2017

2011 Site Photographs:

Photo Point 1

18/10/2011

Photo 4

28/03/2017

18/10/2011

Photo 5

28/03/2017

18/10/2011

Photo 6

28/03/2017

Photo Point 2

18/10/2011

Photo 7

28/03/2017

18/10/2011

Photo 8

28/03/2017

Name: Steve Slater **Site/farm Location:** Gingin

Project Type: Saltbush **Soil Type**: Poor/average sand.

Project Year: 2012

Funding Body: Caring For our Country

Project Overview: Steve had an area on his property that was marginally salty, often waterlogged and had limited amounts of feed. He planted this area to saltbush to be able to enhance the grazing potential and to limit the increase of salinity. Steve planted the area with old man, eyres green and river salt bush and had reasonably good survival rates of both. The seedlings planted in the very waterlogged areas did not survive.

What worked: Steve thought the project was successful particularly in increasing the grazing potential of the previously bare and waterlogged area. The saltbush also aided in reducing the waterlogging of the area, however not to a great extent. Steve was particularly happy to get involved with this project as it opened up a new knowledge base for him to start looking further at more fodder shrubs and pasture options.

What didn't work and what would you do differently: Steve was disappointed that the eyres green and river saltbush varieties began to die off from the middle of the plant. He would have preferred to have just put in old man saltbush rather than the three different varieties, or Anameka saltbush if it became more economical to do so. Steve also noted that the area did get too wet in some years and impacted the health of the saltbush.

Site Photographs: 6/07/2012

***Steve is no longer on the farm so recent photos could not be obtained.*

Name: Nick Scotney **Site/farm Location:** Piawaning

Project Type: Saltbush **Soil Type**: Deep loam

Project Year: 2011

Funding Body: Caring For our Country

Project Overview: The area planted to salt bush on Nick's property is an existing watercourse/creek line that had been unused and salty for the years before the project. Nick previously cropped the edges of the area when they were not salty, however this salinity increased and cropping was no longer viable or productive. By planting to saltbush Nick hoped to transform unproductive land into an area that could provide some grazing possibilities.

The rows were mounded and left for a period of time to reduce the impact from the high salt concentration and hopefully get a good survival rate. The seedlings were then planted on the mounds however the survival rate was only moderate, at approximately 50%, as the area was just too salty. The fencing around the saltbush was also included in the project.

What worked: Although only 50% survived Nick was still pleased with the project as he now has some productivity on the salty water course. Having the fence was a huge positive for Nick as he was able to keep the stock off the area in the first year of planting and can now still control the grazing while still cropping the adjacent paddock.

What didn't work and what would you do differently: Nick was disappointed with the survival rate of the seedlings. Although 50% still survived these have been slow growing. The area had too high a concentration of salt for all to survive and thrive. In hindsight Nick would have just planted the fringes of the salty watercourse to begin with to ensure that all survived and the seedlings were not wasted. For the inner area where the salt concentration was highest he would have liked to have tried to plant something with a higher salt tolerance.

Site Photographs:

Photo Point 1

6/03/2012

Photo 1

27/04/2017

6/03/2012

Photo 2

27/04/2017

6/03/2012

Photo 3

27/04/2017

Photo Point 2

6/03/2012

Photo 4

27/04/2017

6/03/2012

Photo 5

27/04/2017

Name: Ken Seymour **Site/farm Location:** Miling

Project Type: Saltbush **Soil Type**: Deep loam

Project Year: 2010 & 2012

Funding Body: Caring For our Country

Project Overview: Saltbush was planted on these two sites by Ken to be able to make some use of the salty land. The sites were two different projects planted over two different years, 2010 and 2012 but in similar areas. The areas were previously cropped however became too wet and too salty and were fenced off from the rest of the paddock and were then left unused. Ken was interested in planting saltbush in order to create some productivity from the land in the form of grazing. Ken planted both the old man and river saltbush varieties and had a good survival rate at both sites of approximately >80%.

What worked: The saltbush plantings were successful for Ken as he had a good survival rate which allowed for the areas to provide great amounts of feed each year. Ken is able to graze the area for months, which is particularly useful in dry years and during the summer months. He is happy to get some use out of some otherwise unproductive land.

What didn't work and what would you do differently: There were no negative aspects of the project for Ken, he would have planted a larger area if he could. He would be interested in planting one variety and seeing if that is better in terms of the productivity as fodder for sheep.

2010 Site Photographs:

3/11/2010

Photo 1

11/4/2017

3/11/2010

Photo 2

11/4/2017

3/11/2010

Photo 3

11/4/2017

2012 Site Photographs:

Photo Point 1

7/08/2012

Photo 4

11/4/2017

7/08/2012

Photo 5

11/4/2017

7/08/2012

Photo 6

11/4/2017

Name: Bruce and Cynthia Topham **Site/farm Location:** Miling

Project Type: Saltbush **Soil Type**: Deep loam

Project Year: 2008, 2011 & 2013

Funding Body: 2008—National Action Plan

2011 & 2013—Caring For our Country

Project Overview: Bruce and Cynthia's property is situated low in the landscape and has been impacted by the rising level of salt in the soil. They mostly run sheep on their farm and were interested in increasing their grazing capacity over the land, and in particular creating productive grazing areas off marginally salty land. They were very keen to ensure nearly all of their property is productive. They began planting saltbush themselves before the projects were available, however having help with the project subsidy allowed them to expand the areas of saltbush and turn more unused land into productive grazing areas. They were involved in three different saltbush projects in the years of 2008, 2011 and 2013. Bruce and Cynthia were also determined to transform the valley, were their property lies, aesthetically by returning greenery and living plants to the landscape.

They have planted both old man and river saltbush in al three projects. They planted the saltbush themselves and had some areas ripped and then mounded, where the salt concentration is higher, but the most of the salt bush was planted without mounding. This is their preferred method of planting. They had great survival rates over all of the three years at approximately >80%.

What worked: Bruce and Cynthia have been able to increase the grazing capacity of the land by planting the saltbush, and have reduced the amount of extra feed they must bring in to supplement through the drier months. They provide some hay or lupins as roughage for the sheep however they have clover growing amongst the saltbush and this provides much of the roughage necessary. Because they mainly run sheep the high vitamin E concentration in the saltbush has been a huge benefit.

Not only has the saltbush been very successful as feed they have also increased the biodiversity of the valley and has encouraged more birdlife, such as wrens, and other native wildlife to return to the area. The saltbush has also slowed the flow of the water through the valley, which has been very beneficial as they lie on one of the main water/flood channels into the Moore River system. The valley floor has also greatly improved aesthetically.

What didn't work and what would you do differently: Bruce and Cynthia had no negatives to say about the project—they are extremely happy with it.

Site Photographs:

14/11/2008

Photo 1

28/04/2017

14/11/2008

Photo 2

28/04/2017

9/11/2010

Photo 3

28/04/2017

9/11/2010

Photo 3

28/04/2017

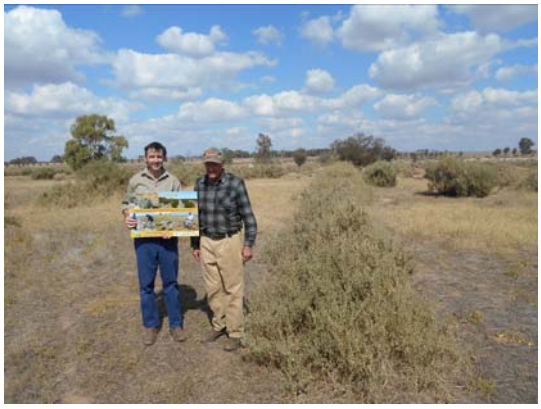
Bruce and his saltbush 2010

Name: Frank, Cecil & Brendon Tierney **Site/farm Location:** Bindi Bindi

Project Type: Saltbush **Soil Type**: Deep loam

Project Year: 2010 & 2011

Funding Body: 2010 & 2011—Caring For our Country



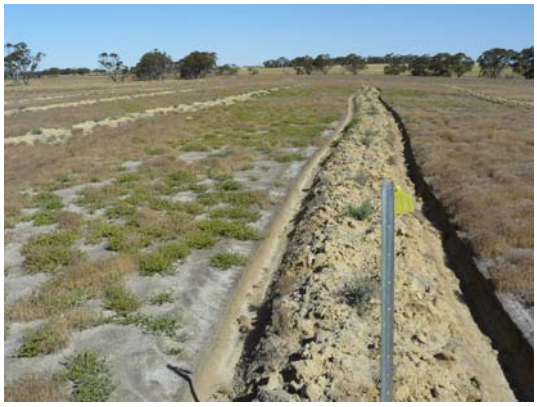
Project Overview: The Tierney's were interested in getting involved with these saltbush projects primarily for land conservation reasons. The creek running through the property was salty and was degrading. Parts of the saltbush sites were historically cropped but had since gone too salty. They were keen to get saltbush on the area due to it's known ability to survive on salt land and it's palatability for sheep. They were involved in two projects, on in 2010 and the other in 2011 and both areas were fenced off from the larger paddocks.

The two sites were mounded and planted to both old man and river saltbush. They had mixed survival rates over the two projects, but in the areas where survival was low the saltbush was re-planted and they then had an overall survival rate of >80%.

What worked: The Tierney's have found the project successful. The saltbush has provided excellent feed, particularly the river saltbush, and therefore increased productivity of the two sites. The salt bush has also helped in stabilising the creek and reducing any further degradation just by providing cover and roughage across the landscape. Having fencing included in the project has helped with the reduction in degradation by controlling the grazing that occurs in the areas. There are also some native trees regenerating around the fringes of the area, most likely being able to shoot up since being fenced off and protected from extensive grazing and cropping.

What didn't work and what would you do differently: Although the project was overall very successful one downfall since has been the establishment of more couch through the sites. This has been difficult for the Tierney's to control amongst the mounds of saltbush. They also would have preferred to plant all river saltbush having seen the palatability of it compared to old man. If they wanted to really take advantage of the saltbush as a fodder shrub they would have been interested in having more fencing through the sites to break them into smaller areas for more intense rotational grazing.

2009 Site Photographs:



3/11/2010

Photo 1

19/04/2017

3/11/2010

Photo 2

19/04/2017

3/11/2010

Photo 3

19/04/2017

3/11/2010

Photo 4

19/04/2017

2012 Site Photographs:

Photo Point 1

16/12/2011

Photo 5

19/04/2017

16/12/2011

Photo 6

19/04/2017

Photo Point 2

16/12/2011

Photo 7

19/04/2017

16/12/2011

Photo 8

19/04/2017

16/12/2011

Photo 9

19/04/2017

Tierneys' and saltbush 2010

Name: Rob & Maria Wood **Site/farm Location:** Bindi Bindi

Project Type: Saltbush **Soil Type**: Deep loam

Project Year: 2010 & 2011

Funding Body: 2010 & 2011—Caring For our Country

Project Overview: Rob and Maria were very keen to plant saltbush on their salt impacted ground where they had limited productivity. The two sites planted in 2010 and 2011 were previously unused apart from some very minor grazing. The sites are located in a runoff channel/ watercourse that runs through the property. Primarily Rob and Maria wanted to just get something to grow in the area, the salt bush doubling as sheep feed was an added bonus.

They had both old man and river saltbush planted. The sites were mounded before planting to assist in the high salt concentrated ground. They had limited survival in the 2010 site where approximately 50% survived. The 2011 site had a very good survival rate at approximately >75%.

What worked: Rob and Maria have found the project to be very successful. They now have cover over the salty ground which improves it aesthetically and mitigate water and wind erosion. The saltbush transformed the baron looking scold areas into living habitat. The areas have since increased in ground cover with more plants moving in, germinating and growing.

The saltbush has also provided them with a good source of feed for their sheep when feed is limited around the rest of the property. They have recently leased the property and so no longer heavily graze the areas. They said that the saltbush project has been the best on-farm incentive project that could have been offered.

What didn't work and what would you do differently: Rob and Maria have no negative feedback about the project. The only disappointment was the low survival rate of the 2010 site, it was just too salty in this area.

2010 Site Photographs:

2/11/2010

Photo 1

6/04/2017

2/11/2010

Photo 2

6/04/2017

2/11/2010

Photo 3

6/04/2017

2011 Site Photographs:

Photo Point 1

15/12/2011

Photo 4

6/04/2017

15/12/2011

Photo 5

6/04/2017

15/12/2011

Photo 6

6/04/2017

Photo Point 2

15/12/2011

Photo 7

6/04/2017

15/12/2011

Photo 8

6/04/2017

Woods' 2010

Name: Tony White **Site/farm Location:** Miling

Project Type: Saltbush **Soil Type**: Loam

Project Year: 2008 & 2011

Funding Body: 2008—National Action Plan

2011—Caring For our Country

Project Overview: Tony got involved in two saltbush projects run in 2008 and in 2011.He planted the saltbush from both projects on a salty watercourse/runoff channel. The area was unproductive, salty and bare. He was keen to get some cover over the two areas to increase the productivity of the land and get coverage. The saltbush was added into his grazing program. He had both old man and river saltbush planted. The 2008 site was planted by hand and had a great survival rate of approximately >80%. The 2011 site was more difficult during planting as it was wet and boggy. The area was mounded to account for this however there was still a lower survival rate here of approximately >60-70%.

What worked: The project was very successful for Tony. After planting he had great growth of the saltbush and can now use the land for grazing. The projects have transformed unused and unproductive land into profitable grazing country. The saltbush have been self-seeding amongst the rows planted which will hopefully further increase the productivity of the area. There is also a greater diversity of other plants that have begun to shoot up amongst the saltbush.

What didn't work and what would you do differently: Tony was very happy with the project. The only negative aspect of the project is the issue of chasing the sheep through a paddock that has mounds and rivets throughout. This can be very difficult and would have been interested to see if there was a better design to make this easier.

2008 Site Photographs:

17/11/2017

Photo 1

28/03/2017

17/11/2017

Photo 2

28/03/2017

2011 Site Photographs:

Photo Point 1

17/11/2011

Photo 3

28/03/2017

17/11/2011

Photo 4

28/03/2017

Photo Point 2

17/11/2011

Photo 5

28/03/2017

17/11/2011

Photo 6

28/03/2017

Name: Sarah Mason **Site/farm Location:** Calingiri

Project Type: Saltbush **Soil Type**: Loam, some gravel

Project Year: 2012

Funding Body: Caring For our Country

Project Overview: Sarah's property was only recently cleared in the early 1980's. Despite this late clearing, and the fact that her property is at the top of the surrounding landscape, the valleys of the farm were getting waterlogged and increasing in the salt concentration. Heavy machinery could not get through these area due to the waterlogging, and hence they could not crop it very easily. The Saltbush was planted to provide increased grazing potential on this waterlogged ground while stabilising it and reducing the risk of this waterlogging and salinity spreading to the surrounding arable paddock.

There was both river and old man saltbush planted and they both had great survival rates. The saltbush has been lightly grazed once and then heavily grazed once since planting.

What worked: The saltbush has greatly improved the area. The waterlogging has severely decreased and has therefore also reduced the risk increasing salinity in the arable adjacent paddock. The saltbush has grown very well and has provided great amounts of feed when it is needed. It has only been grazed twice and will provide more feed in the coming years, particularly through times of drought.

What didn't work and what would you do differently: Sarah had no negative feedback about the saltbush project.

Site Photographs: taken 24/05/2017

** There are no 'before' photographs

Name: Brian Stacey **Site/farm Location:** Watheroo

Project Type: Saltbush **Soil Type**: Sand

Project Year: 2010 & 2011

Funding Body: Caring For our Country

Project Overview: Brian planted saltbush under two incentive programs over two years (2010 and 2011). The area planted to saltbush was a large area of a salty creek line/runoff channel. It was never cropped and was previously left unused. By planting saltbush Brian hoped t transform the salty area into productive grazing land. Brian did not want the salt impacted area to spread further into the surrounding arable paddocks. The two years of plantings were along the same channel. There was very good survival rate after an easy planting at both sites.

What worked: The saltbush had great survival rates and grew well in the area planted. This allowed Brian to create good productive grazing land on a previously unused salty creek. He was very happy with the project. Brian has since left the farm and the saltbush no longer gets grazed.

What didn't work and what would you do differently: Brian had no negative feedback about this project.

Site Photographs:

12/05/2011

Photo 1

25/05/2017

12/05/2011

Photo 2

25/05/2017

Name: Alex Keamy **Site/farm Location:** Watheroo

Project Type: Saltbush **Soil Type**: Sand

Project Year: 2011

Funding Body: Caring For our Country

Project Overview: The 15ha area planted to saltbush was bare, unused ground that was always too salty to crop. By planting the area to saltbush the Keamy's hoped to get some productivity out of the area. The project included the fencing of the area to allow for better management for sheep grazing. 8, 000 saltbush seedlings were planted, 4,000 of Old Man and 4, 000 of River saltbush were planted, both having great survival rates of >90%. The sheep graze the area every year.

What worked: Having such great survival rates the saltbush has been a great asset to the Keamy's. The sheep are able to run through the fenced saltbush area and also have use of the surrounding paddock (if not cropped), as roughage. This takes pressure off the grazing system, particularly in the very dry years.

What didn't work and what would you do differently: Alex has been very happy with the saltbush project, the only thing he would change is the alignment of the fence surrounding the project.

Site Photographs:

Photo Point 2

01/05/12

Photo 1

12/10/17

01/05/12

Photo 2

12/10/17

Name: CSIRO Enrich Trial Plots (4x sites) **Site/farm Location:** Miling, Nambam & Calingiri

Ken Seymour, Aaron Edmondson, Tony White, Dan Hastie

Project Type: ENRICH Saltbush **Soil Type**: Various - deep loam, sand, clay

Project Year: 2009—2013

Funding Body: Caring For Our Country

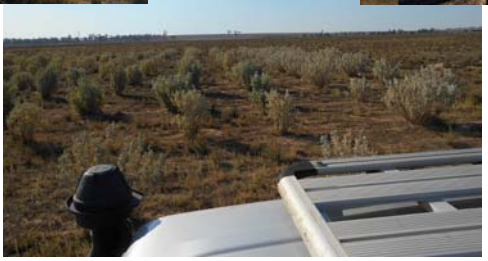
Project Overview: Four CSIRO Enrich saltbush trail plots were planted in the Moore Catchment area for research into finding an elite Oldman Saltbush cultivar with higher digestibility and palatability that grows well in wheatbelt conditions. The plots include 12 different cultivars that were selected from an original 60, 000. The selection process was done by monitoring the sheep grazing patterns across the different cultivars. These four sites are apart of ten sites where the 12 cultivars have been trialled across the wheatbelt. Each location was donated to Moore Catchment Council by the farmers who also assisted in the planting of the sites.

What worked: At each trial plot the saltbush has survived and grown reasonably well.

What didn't work and what would you do differently: CSIRO mentioned that the MCC trial plots offered up differing results from other trials state-wide. For example, the site at the White's property was successful in showing the same trends of sheep preferring the same cultivars as other state-wide sites, however the other three MCC trial sites did not. CSIRO have been sporadic on monitoring these sites due to funding issues.

Site Photographs:

Ken Seymour's Plot (2017)



Dan Hastie's Plot (2017)

Tony White's Plot

Photos from June 2010 after grazing

Photos from November 2017

4.0 Tree Crops

4.1 Project overview:

The tree crop project was run out over the years of 2009—2011. This project was funded through NACC by the Caring for Our Country program. The aim was to plant tree crop plantations strategically in order to minimise the risk of wind erosion. The project also aimed to attract development of more diverse industry opportunities. The trees offered within this project were Oil Mallees and Sandalwood hosts. The most popular tree that was planted in the Moore Catchment area was Oil Mallees. There was only one project that involved planting the sandalwood hosts.

An oil mallee plantation

4.2 The Industry

4.2.1 Sandalwood

Sandalwood has been a prominent industry in Western Australia for many years with it's popularity stemming from the aromatic oils used for joss sticks and incense. The market is strong for these particularly in Asia, with the largest importers of Australian sandalwood being Hong Kong and China *(Forest Products Commission, n.d).* There is also a local market developing for the use of the oil in perfume, incense and pharmaceuticals. The market continues to grow both locally and internationally as the Asian market develops further in Malaysia, Singapore, Thailand and India *(Forest Products Commission, n.d).*

The Western Australian sandalwood export market has been able to thrive as the Indian sandalwood supply has been depleted from over harvesting. Western Australian sandalwood has increased it's global market share to 40% (*Forest Products Commission).* At present native stands of sandalwood cover much of the market demand (*Forest Products Commission*).

4.2.2 Oil Mallees

At the time of the project there had been a research & development push into the oil mallee industry focusing on oil harvesting, activated carbon, the carbon credit scheme, wood products and the development of an 'Integrated Wood Processing' (IWP) facility to produce electricity. The markets found for these products of oil mallee trees were small and emerging markets. A thorough outline of these industries is included in the 'Oil mallee industry development plan for Western Australia', produced by URS Australia.

Kochii Eucalyptus Oil

The IWP facility was designed and trialled to produce oil, charcoal, activated carbon and electricity in the one process to keep the industry profitable. A trial facility was located in Narrogin operated by Verve Energy and ran throughout 2005 however was closed in 2006 after the trial period was complete.

The carbon trading scheme was another industry possibility used to promote the planting of oil mallees however has not proven to be very viable on small scale plantings such as was done throughout the MCC projects. The oil mallees were chosen as an ideal tree to plant due to their ability to store large amounts of carbon in their root systems and their suitability to grow in the semi-arid and moderately saline conditions of the wheatbelt. The effort put into to getting involved with the scheme, along with the thorough auditing of it, does not make the small returns worthwhile according to many farmers spoken to throughout the review project.

The furnace producing steam using the left over biomass from the oil production

Eucalyptus oil production currently seems to be the more profitable markets for use of oil mallees. Kochii Eucalyptus Oil, an offshoot industry of Fares Rural, is an eucalyptus oil distilling factory operating on a farm just out of Kalannie. They produce approximately 80—100L of oil per day and sell mainly in bulk of 1,000L. They now sell smaller bottles ranging from 50 mL—500 mL and eucalyptus infused candles online at www.kochiioil.com.au.

Kochii Eucalyptus has been operating full time for approximately a year, harvesting oil mallees mainly from Ian Stanley's property in Kalannie. They have also harvested off up to 7 other properties close by the distillery. They operate by pulsing steam, produced from a furnace fuelled by the left over oil mallee biomass, up through a vault packed with freshly harvested oil mallee branches and leaves to extract out the oil by condensation. This then moves through another chamber and mixes with cool water and flows into a tank . As this tanks fills the oil, being lighter than water, separates from the water and sits on the top until the tank is filled and the oil flows off through a pipe into a separate tank.

The chamber where the water and oil mixture flows through and down into the tank where is eventually separates.

The oil produced by Kochii Eucalyptus is very high quality, with a cineole of ~90% each batch. The market for this oil is still emerging and is continuing to grow. Ian Stanley, of Kochii Eucalyptus, is comfortable with this rate of growth and believes the market will remain and will continue grow to support their factory production for many years to come. The abundant amount of oil mallee trees surrounding the factory means that the supply of leave matter is not short.

Oil flowing out of the tank as it separates from the water.

The furnace and oil extraction chamber at the Kochii Eucalyptus factory

4.3 Summary of Project

The feedback from farmers about the tree crop projects has been mixed. All farmers were happy about the good survival rate and quick growth of the oil mallees. This meant they had protection on the sandy paddocks from wind erosion soon after planting. The market for eucalyptus oil is still quite small locally but is continually growing, while the carbon credit scheme is not viable on these small farm plantations. Although the carbon credit scheme and the market for oil hasn't taken off to a large extent yet this has not been a huge disappointed to most farmers involved. The one sandalwood project was not a huge success.

4.4 Recommendations

- Plant your oil mallee seedlings where they will achieve the greatest protection from strong prevailing winds.
- If you are a current grower and interested in harvesting your trees for oil contact Kochii Eucalyptus Oil.
- Ensure your trees are grown at a location or in a design that will be of use long term, if not it can be a great task to remove them.
- If you are not interested in using oil mallee trees for productivity purposes a mixed revegetation planting may be of better value.

To buy Kochii Oil products visit www.kochiioil.com.au. You can buy either online or from stockist outlined on the website. For more information on the product and industry contact Kochii Eucalyptus on 0458 011 599 or via email at info@kochiieucalyptusoil.com.au. Alternatively contact Ian Stanley on 0428 910 351.

4.5 Tree crop site inspections

Name: Les Crane **Site/farm Location:** Bindi Bindi

Project Type: Oil Mallees **Soil Type:** Gravelly loam

Project Year: Two projects - 2009 & 2010

Funding Body: Caring For Our Country.

Video interview link: https://youtu.be/DBKBSu4A-XU

Project Overview: Les runs a wheat and sheep farm and has envisioned a changing system of farming. This is the change into smaller paddocks to take advantage of a rotational grazing system while still allowing to crop in between. He has planted oil mallees for use as shade along the break between the paddocks. He has planted them in rows, along fence lines amongst saltbush. He chose to add the oil mallees amongst the saltbush to create areas in each of the smaller paddocks that have increased feed and shade opportunities.

Les got involved in two separate oil mallee projects in the years 2009 and 2010. The planting of the trees in both years was relatively successful with most seedlings surviving. There was notably less trees that survived at the top of the hills. Despite this the oil mallee stand is impressive and will continue to grow well now they are established and will create great amounts of shade and shelter for sheep.

What worked: Les has been happy with the establishment of the trees. They have been successful in growing amongst the saltbush to provide shade for the sheep.

What didn't work and what would you do differently: In hindsight Les would have planted the seedlings further from the fence to accommodate for falling limbs in the future. This would reduce the amount of fencing repairs in the future. Another shortfall would be the limited survival of trees on the top of the hills. Despite this there were no negative comments about the project itself.

Photo Point 1

2009 Site Photo-graphs:

11/11/2009

Photo 1

18/04/2017

11/11/2009

Photo 2

18/04/2017

Photo Point 2

11/11/2009

Photo 3

18/04/2017

11/11/2009

Photo 4

18/04/2017

2010 Site Photographs:

Photo Point 1

18/11/2010

Photo 1

18/04/2017

Photo Point 2

18/11/2010

Photo 2

18/04/2017

Name: Phil Martin

Site/farm Location: Watheroo

Project Type: Oil Mallees

Soil Type: poor/average sand

Project Year: Two projects -both 2009

Funding Body: Caring For Our Country

Project Overview: Phil decided to get involved with these two oil mallee projects in order to get cover over sandy, non-wetting and unproductive paddocks. The areas planted to oil mallees struggled to grow a good crop, were susceptible to wind erosion and were just up gradient from a waterlogged and salty area. It was hoped that by growing oil mallees here it would reduce the waterlogging down gradient, hold the amount of salinity and also create some sort of wildlife corridor across the landscape.

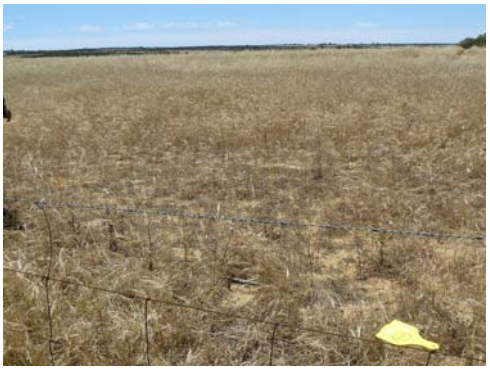
There was a good survival rate after the planting of the seedlings of ~90%.

What worked: The project has been successful as the trees have had great growth since planting and have reduced any blowing of the sandy topsoil of the paddock. Further down stream Phil has noted a definite lowering in the water table and reduced waterlogging. The oil mallees have also created protected habitat for wildlife that connects up across the landscape.

What didn't work and what would you do differently: Phil has been very happy with the results of the oil mallee project however with new soil preparation technologies the area planted would now grow a relatively successful crop.

Site Photographs:

Site 1



16/11/2009

Photo 1

7/04/2017

16/11/2009

Photo 2

7/04/2017

16/11/2009

Photo 3

7/04/2017

Site 2

16/11/2010

Photo 4

7/04/2017

16/11/2010

Photo 5

7/04/2017

16/11/2010

Photo 5

7/04/2017

Name: Gary & Wayde Parker

Site/farm Location: Marchagee

Project Type: Oil Mallees

Soil Type: Sand over gravel

Project Year: 2012

Funding Body: Caring For Our Country

Project Overview: Gary and Wayde have had big problems on their property from wind eroding the sandy paddocks and creating blowouts across the property. The area that was planted to Oil Mallee's had previously been cropped and grazed however had suffered from wind degradation. They decided that they needed to cover this area in order to protect the topsoil here and of the surrounding paddock. By targeting the oil mallee planting here they thought that it would cover the worst effected area and help in protecting the surrounding area to continue cropping it.

Gary and Wayde planted York Gums and two different varieties of oil mallees. They did not plant the oil mallees to harvest the oil or for carbon credits. They had a very good survival rate here and the trees have continued to grow and remain healthy.

What worked: Wayde and Gary have found the project successful as the trees have grown and have been successful in limiting the extent of wind erosion. As the area planted was the most impacted by the strong winds having this cover has helped in stabilising this soil and not blowing it over the rest of the property. The trees have also acted as a wind break for the neighbouring areas of the farm allowing this soil to also stabilise and improve the cropping capacity.

What didn't work and what would you do differently: The project itself was very successful and there was minimal negative feedback. Wayde mentioned that there is still some wind erosion occurring around the areas planted however it is largely reduced by having the tree belt planted. Wayde also is not in huge favour of oil mallee trees as they re-generate very easily over his property and often take root in the middle of the paddock, he would prefer to plant a tree species that would not spread as easily into the open paddock.

Site Photographs:

Photo Point 1

2/10/2012

Photo 1

13/04/2017

2/10/2012

Photo 2

13/04/2017

2/10/2012

Photo 3

13/04/2017

Photo Point 2

2/10/2012

Photo 4

13/04/2017

2/10/2012

Photo 5

13/04/2017

2/10/2012

Photo 6

13/04/2017

Name: Neil Pearse **Site/farm Location:** Miling

Project Type: Oil Mallee **Soil Type:** Average sand over gravel

Project Year: 2010

Funding Body: Caring For Our Country.

Video interview link: https://youtu.be/iJfKZfJWU4M

Project Overview: The area planted to oil mallees on Neil's property is a gutless white sandy paddock that suffered from extensive wind erosion causing blow outs. Part of the paddock had already been planted to tagasaste in an alley formation and the remainder had been used for cropping and grazing. The tagasaste only covered the northern side of the paddock and Neil needed something else grown on the southern side to stabilise the ground. The oil mallees were not planted with the desire to harvest the oil or get carbon credits, although Neil would be happy for that to happen if the opportunity arose.

Neil had approximately 20, 000 seedlings planted over an 11.73ha area. There was a great survival rate of between 80 –90%. The majority of the seedlings that did not survive were located in the most south western corner of the paddock where there are the poorest sands. Neil hoped by planting oil mallees here they would buffer the winds and stabilise the paddock so that the amount of wind erosion would be minimised and the topsoil and soil structure would improve.

What worked: The seedlings had a great survival rate and have grown well in most areas of the paddock. They have reduced the impact from the strong winds significantly. Neil is very happy how the project went and is happy to see that more oil mallees are self-seeding amongst the rows and thickening them up further. The paddock has improved stability since having the oil mallees planted.

What didn't work and what would you do differently: Although the project has been mostly successful there has been limited growth of ground covering grasses between the rows of trees and the alleys. This has meant that during the dry summer months, particularly after harvest, the wind channels itself through the alleys. Neil has also mentioned that the design of alley farming could be an issue for people in the future who may get annoyed with having a more difficult design to drive the seedier or harvester through, however this does not bother him. If he did this project again Neil would take out every second row of trees and plant these all in the southwest corner to block off that area of poor sand where the majority of the erosion occurs.

Site Photographs:

Photo 1

11/11/2010

5/04/2017

11/11/2010

Photo 2

5/04/2017

11/11/2010

Photo 3

5/04/2017

Name: Jeff Pearse

Site/farm Location: Wubin

Project Type: Tree Crop (York Gums)

Soil Type: Average sand

Project Year: 2011

Funding Body: Caring For Our Country

Project Overview: The are that was planted to oil mallees on Jeff's property was never cropped due to un-suitable conditions. Jeff was interested in getting involved with the oil mallee harvesting industry and carbon credit scheme to diversify the income on the farm. He had over 13,000 seedlings planted over the area and had a great survival rate of approximately 90%. Primarily the trees were planted as an opportunity to diversify the farm, but also to provide cover on an area that was otherwise un-used.

What worked: The project was successful in that the trees had a great survival rate and grew much quicker then what Jeff thought they would. The way the project was rolled out was simple and worked well for what he wanted.

What didn't work and what would you do differently: Jeff was disappointed that the carbon credit scheme was not viable for his plantation as the planting pattern was incorrect. He was still overall happy with the project and would do it again if the in-centive was offered again.

Site Photographs:

18/10/2011

Photo 1

18/10/2011

18/10/2011

Photo 2

18/10/2011

Name: Louis Southcott (Sam & Beth)

Site/farm Location: Marchagee

Project Type: Oil Mallees

Soil Type: Average sand

Project Year: 2010

Funding Body: Caring For Our Country

Project Overview: The area planted to oil mallees on Louis' property was done so to protect it from continued wind erosion. The soil is sandy and had no ground cover during parts of the year and hence had no protection from strong winds. The area suffered from a lack of soil structure and stability due to this wind erosion, Louis hoped by planting the oil mallees these factors would improve.

The trees were planted in an alley farming design with two rows close together and then enough space between the next rows to crop between. They did not plant with the expectation to harvest for oil or to be involved with the carbon credit scheme. The survival rate of the trees was relatively good at this site. The Southcott's were glad for the offered incentive for planting, otherwise the project would not have gone ahead.

What worked: The Southcott's were happy with the results from the project. As the survival rate was relatively good they got coverage over the area and this created a good break from the strong winds. By planting these oil mallees the soil has been able to stabilise and the topsoil no longer gets blown away as it previously did. The Southcott's have since sold this property so are not sure if these benefits are still ongoing.

What didn't work and what would you do differently: There was no negative feedback about this project. They planted these trees with an open mind as to if they would work or not and didn't have any huge expectations.

Site Photographs:

*** No 2017 Photographs were obtained*

Name: Alex Keamy **Site/farm Location:** Watheroo

Project Type: Oil Mallees **Soil Type:** Average sand

Project Year: 2010

Funding Body: Caring For Our Country

Project Overview: 10, 000 oil mallee seedlings were planted in rows across a sandy windy paddock,. The oil mallees were planted to act as a wind break across the peak of a sandy area. By planting in rows (beginning along the fence line) the Keamy's would still be able to crop between the trees. The establishment of the oil mallee trees were to provide shelter from the wind to enhance crop establishment in the sandy soil and to also assist in surface and subsurface soil stabilisation. Across the area that was planted in the project the are a number of large blow out spots.

The actual planting of the oil mallees was not done very well and coupling this with a dry year there was initially a low survival rate. Over the years this survival rate diminished further and noe approximately 30% of the original plantings is still standing. While three rows across the paddock were planted only one is still remaining in it's entirety.

What worked: The one stand of oil mallees that survived is along the fence line and lower in the landscape, however still provides a reasonable initial wind break. Throughout the other two rows that were planted there are few surviving. These surviving trees indicate that it is possible to grow the oil mallees here and in future something could be grown to buffer the strong winds and reduce paddock blowouts.

What didn't work and what would you do differently: To ensure a better result Alex would have a better initial planting to give the seedlings a better chance at survival from the start.

Site Photographs:

11/03/2010

11/102017

Photo 1

11/03/2010

11/10/2017

Photo 2

Name: Tony Ruse **Site/farm Location:** Gingin

Project Type: Oil Mallees **Soil Type:** Average sand

Project Year: 2010

Funding Body: Caring For Our Country

Video interview link: https://youtu.be/lqAFjg4wMG4

Project Overview: Tony got involved in planting oil mallees to create shelter belts across his paddock to stabilise the soil, stop the topsoil blowing away and eventually create a self sustaining system by improving the soil health. The area was bare an grazed before Tony planted the oil mallees. They were intended to not only create protection from the wind, but also to create shade for the sheep, to cool the soil and improve soil biology. The design of the rows was done to enable enough room in between to seed perennial pastures.

The seedlings were planted across the paddock however did not have a very good survival and establishment rate. Over the years following planting only approximately 25% have survived. Since this initial planting of oil mallees Tony has reseeded with a diverse range of native plants.

What worked: Having such a low overall survival rate was not ideal for Tony, however they were a good starting point for the protection of the paddock. Tony has since done infill with a range of species. The oil mallees that have survived have grown very well and create great amounts of shade and wind protection.

What didn't work and what would you do differently: One downside of the oil mallees is that dominate the landscape where they are planted. In the rows that had the greatest survival it has been noted that the trees even outcompete any groundcover leaving the ground bare between the trees. As creating a diverse and healthy biology within the soil was one of the main reasons Tony planted the trees this is a major drawback. In future he will plant his shelter belts with a variety of different types of native plants.

Site Photographs:

20/11/2012

Photo 1

12/10/2017

20/11/2012

Photo 2

12/10/2017

5.0 Perennial Pastures

5.1 Project overview

Typical bare, sandy paddock prone to wind erosion in the MCC area.

This project was aimed at stabilising sandy, non-wetting soil by creating ground cover all year round to minimise wind erosion. The project was funded by the Caring for Our Country program, through NACC. The land planted to perennials in this project was required to be at a minimum 20 ha and at a maximum 80 ha. The sites selected had to be prone to wind erosion. The sites involved with this project in the Moore Catchment area were planted to a mix of sub-tropical grasses, mainly the gatton panic and rhodes varieties. Perennial pastures were an important project to farmers in the area to provide feed throughout the summer months while stabilising paddocks from erosion.

The gatton panic grass is drought tolerant and is very palatable to livestock (both sheep and cattle). The gatton panic is suited to fertile, light soils but doesn't grow well in waterlogged areas. The rhodes grasses are also well suited to light soil types however are slightly less palatable than panic. The mixes that were planted within the project varied for each farmer throughout the years the project was run. Generally the mix had higher percentages of panic (≥60%) than Rhodes (≥20%). Often kikuyu was added into the mixtures.

5.2 Grazing Perennials

The way that farmers can get the best outcome from their perennial pastures is by short rotational grazing stints in smaller areas. Depending on the site specific conditions, such as average summer rainfall, average temperatures, stocking rate and soil fertility the grazing system would change. This being said it is advised to graze the pastures in short stints, such as 4—5 days, and then leave unstocked to recover. It is advised to have smaller paddocks with high stocking rates to get the best out of the rotational grazing, and the best out of the perennials.

If livestock are left on the perennial pasture paddocks for long periods of time they will preferentially eat out the tastier grasses, therefore damaging the overall productivity of the paddock. This is particularly susceptible to occur when grazing sheep. This also runs the risk of eating the paddock down too low of all grass varieties, therefore impacting future years productivity.

If managed well, with quick and heavy grazing rotations the perennial pastures can greatly boost farm productivity.

5.3 The Future for Perennials

Cattle grazing on the perennials

Advisors are still advocating the planting of perennials, particularly continuing the mixture of rhodes and panic grasses. Further research is going into different varieties of perennial grasses and shrubs, with interest particularly on varieties such as Tedera (a pasture) and Lebeckia (a shrub). These two species are still undergoing trials but have peaked a lot of interest from farmers who aer interested in having a go. They are both legumes, and hence have nitrogen fixing properties which could improve soil properties and therefore the growth of other pasture varieties, and hence greatly improve the overall grazing opportunities of the paddocks.

5.4 Summary of Project

The farmers who were involved with the perennial pasture projects have had mixed results. Some sites have grown extremely well and are being kept on an optimum rotational grazing system, while others had near to no germinated. The perennials require effort put into them initially and diligence when grazing. Where done well the farmers have had great outcomes. Where conditions have been tougher, i.e. during dry years, or where grazing hasn't been managed optimally the perennials have not had as good an effect. Overall the project was well received, with all farmers grateful that the opportunity was provided, not only for the extra summer feed but for the gain in knowledge about how to improve grazing.

5.5 Recommendations

- Prepare your site before seeding. This should include weed control, spading (if in shallower non-wetting sands) and possibly seeding a legume in the year before. Fertilising is also recommended
- Manage the grazing of your perennials.
- Keep your fencing up to date and design a good paddock system for rotational grazing.
- Get you perennial mix right, ensure you are happy with the percentage of Rhodes to Gatton Panic grass.

5.6 Perennial pasture site inspections

Name: Rob Barrett

Site/farm Location: Koojan

Project Type: Perennial Pastures

Soil Type: Poor/average SAND

Project Year: 2013

Funding Body: Caring For Our Country

Project Overview: A tropical mix of perennial grasses was used here at Rob Barrett's property. Rob grazes sheep and in the years prior to the planting of the perennial pastures he had very poor productivity on this area. A major issue of the property is the non-wetting nature of the poor deep white sand. The paddock planted within this project was very susceptible to wind and water erosion with major runoff channels occurring across the paddock after rain and blowouts from wind. The perennials were planted in the hope to reduce this erosion and create a paddock that could be grazed all year round.

The seeding of the grasses went well with a reasonable survival rate over the years to follow. After the past few dry years the perennial pastures have struggled and have not survived. Admittedly Rob says he has not maintained an optimum rotational grazing system and much of the perennials have been eaten off too low. Despite this Rob is happy with the project, and would be enthusiastic to improve his perennial pastures in the future.

What worked: The major success of the project has been the stabilisation of the hillside in terms of wind and water erosion. Channels and blowouts were previously abundant over the paddock, now having some sort of constant cover over the ground these are less severe.

What didn't work and what would you do differently: The non-wetting nature of the soil meant the grasses had only a moderate survival rate and they struggled to grow well long term. Additional to this Rob said his grazing methodology was not appropriate to allow long term productivity on the perennial pastures. Smaller paddocks and common water points had been planned however not yet implemented.

2017site photographs: 27/4/2017

**No photographs before seeding are available





Name: Tom Berrigan **Site/farm Location:** Gingin

Project Type: Perennial Pastures

Soil Type: mixture of poor, average and good red and white SAND with some loamy soils

Project Year: 2010

Funding Body: Caring For Our Country

Project Overview: Tom put in a sub-tropical mix of perennial grasses, mainly Panic and Rhodes grasses. The area sown to perennials had previously been used for grazing with limited summer feed. Due to limited ground cover in summer the paddock would be hugely impacted by water erosion after a heavy summer rain, washing the tops soil down the hillside to the brook flowing through the valley.

The seeding phase of the project was done by a contractor. The paddock was difficult as there were rocks throughout, resulting in seed being sown and different depths. Paddock preparation was not done as well as Tom has done in previous paddocks put to perennials (was not sprayed twice, rocks were not picked etc.). Even with the difficulties with the seeding there was above 90% germination within the first year in parts however in other parts germination was around 60%. Over the years since seeding the perennials have spread and are thickening up in the bare patches. 2010 was a dry year, also influencing the low germination.

Since adding the perennials into the grazing system Tom allows grazing on each perennial paddock in the summer months for about a week, then leaves the pastures for four weeks to recover. This system works very well for him and optimises the feed supply in summer.

What worked: Since the sowing of perennial pastures minimal erosion of the hillslope occurs with a summer rain. The pastures cover enough ground to hold the top soil in place so it doesn't get washed into the valley. There is now feed all year round, increasing the productivity of the land greatly. Another added bonus is the outlook during summer onto green paddocks—although not directly linked to land profitability this makes a huge difference to the landscape outlook.

What didn't work and what would you do differently: The project itself was a huge success for Tom. One regret is not putting in a more kangaroo proof fencing around the paddock. With the property backing onto bush the perennials attract great amounts of kangaroos during summer. Additionally, if done again Tom would have prepared the paddock better to ensure a consistent seeding depth to then increase the germination of the grasses in the years immediately after seeding.

Site photographs:

18/04/2011

9/05/2017

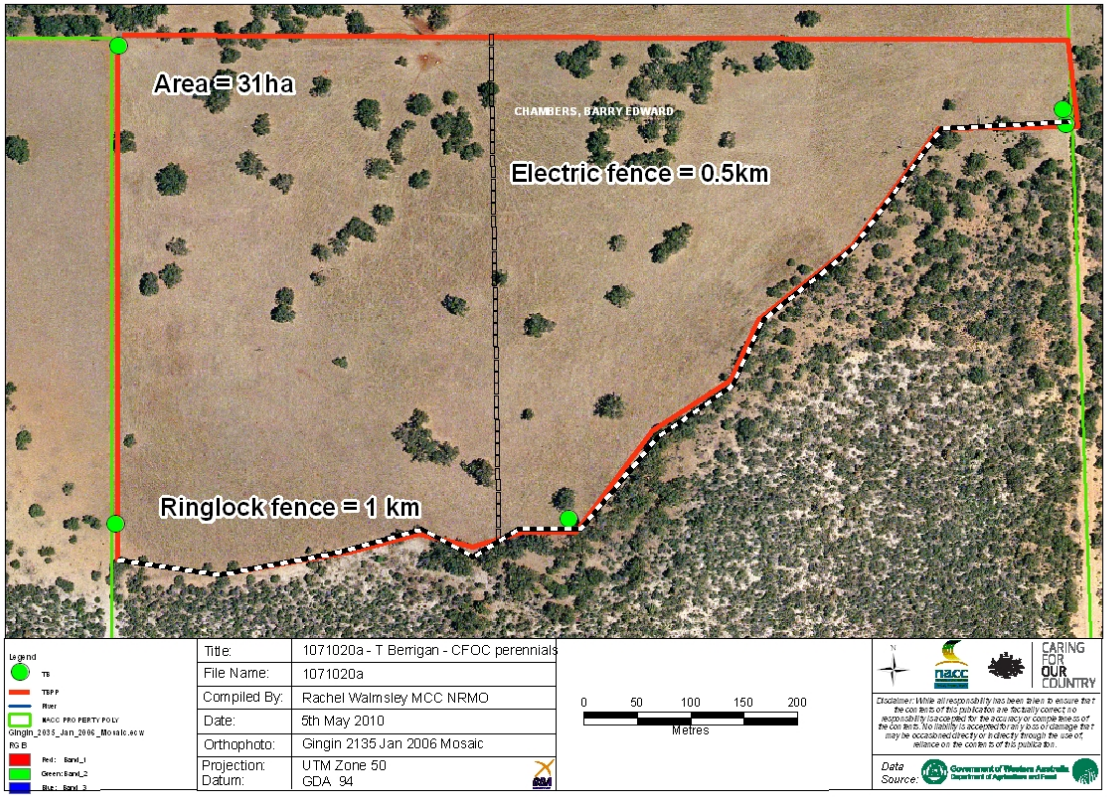
Photo 1

Photo 2

18/04/2011 9/05/2017

Photo 3

18/04/2011 9/05/2017



Name: Errol Howard	**Site/farm Location:** Wannamal
Project Type: Perennial Pastures	**Soil Type:** Loam and some areas sand.
Project Year: 2010	**Funding Body:** Caring For Our Country.

Project Overview: This area planted to perennial pastures had always previously been used for cattle grazing, however the was often waterlogged and Errol was worried that some impacts from increasing salinity may become an issue. Errol also wanted to seed the paddocks to perennials to boost the productivity and to allow for increased summer grazing. Certain areas of sand that were planted to the perennial pastures were impacted in the summer by wind as there was no groundcover, the perennials were also planted in the hope to decrease this impact.

The mix that was seeded was the northern tropical mix, which included Rhodes, Panic and Kikuyu grasses. The year of seeding was very dry and very few germinated straight away, approximately 10%. With better rainfall in the following years more grasses have germinated and thickened up the paddock. It now has good coverage of perennial pastures and is a great feed paddock during summer.

What worked: Although there was very minimal coverage in the immediate year to follow the seeding the perennials have since come up and germinated really well and provide great summer feed. The perennials have also been great at using up the excess water in the paddock, reducing the waterlogging. With the increased coverage over the sandy ground during the summer months these areas have more protection from strong winds that would previously have caused huge amounts of degradation.

What didn't work and what would you do differently: The issue that Errol has come across with the perennial pastures is that he cannot graze his pregnant Heifers on the paddocks as the increased feed causes issues in calving (the Heifers and calves both get too fat). One way he would think to fix this is to have the paddock broken up into smaller areas and rotate the heifers through and back out onto the more bare paddocks at a quicker rate to still make use of the perennials. Another note that Errol has made is that the Panic grasses are thinning out as the cattle prefer to eat this out first and leave the Rhodes and Kikuyu till last. This also comes back to making the paddock smaller, where he can then rotate at quicker and more intense rounds of grazing.

Site Photographs:

11/04/2010

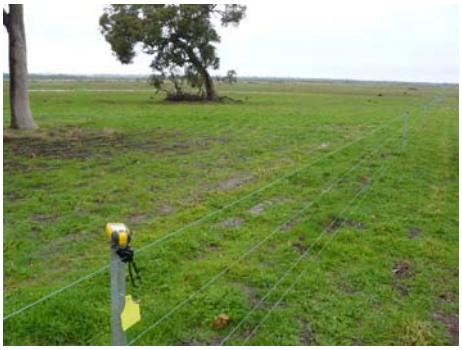
Photo 1

3/05/2017

11/04/2010

Photo 2

3/05/2017



11/04/2010

Photo 3

3/05/2017

11/04/2010

Photo 3

3/05/2017

Errol showing local farmers his seeding equipment

Name: Bob Hamilton **Site/farm Location:** Gillingarra

Project Type: Perennial Pastures

Soil Type: Average SAND. **Project Year:** 2012

Funding Body: Caring For Our Country.

Project Overview: This paddock planted to perennials struggled in summer for feed. By seeding perennial pastures Bob hoped to increase his grazing potential here and transform a very average grazing paddock into a highly productive grazing paddock.

The paddock was seeded in early September to the northern tropical mix with approximately 70% Rhodes grass and 30% panic. The germination rate was average at about 50-60%. Even with this average germination rate Bob utilises the paddock well with a grazing rotation of two weeks on and two weeks off. This allows for recovery of the grasses and ensures that the cattle will constantly have summer feed.

What worked: Bob is happy enough with the project, where the plants have germinated and have grown well they create great feed for the cattle. The perennials have allowed for Bob to have a constant rotation in the dry summer months as they grow back easily each time he relieves the paddock from stock. The planting of these perennials has also allowed for some increased establishment of serradella in parts due to the increased stabilisation and organic matter throughout the soil profile.

What didn't work and what would you do differently: While the project has greatly improved the grazing potential of the paddock Bob was disappointed that only just over half of the seed germinated. With the extent of the area he put, if >80% had germinated Bob would have significantly greater amounts of feed available.

Site Photographs:

25/02/2013

Photo 1

24/04/2017

25/02/2013

Photo 2

24/04/2017

Name: Vern Godfrey **Site/farm Location:** Wannamal

Project Type: Perennial Pastures

Soil Type: Deep sand over gravel, some areas of shallow sand

Project Year: 2012 **Funding Body:** Caring For Our Country.

Project Overview: Vern planted the perennials to 28ha of his property in order to boost the productivity and provide summer feed without having to rely on hay. The area is sandy and non-wetting. Vern had impacts of gully's getting cut out from water erosion over the bare ground. By planting the perennials Vern hoped to increase his feed supply during the summer months and to reduce the amount of water erosion over the paddocks.

He had a contractor seed the perennials and had an average germination rate in the first year. The germination within the first years was approximately >60%, however over the following years to date the perennials have thickened out and have spread across the remaining bare patches. Vern found that he had greater Kikuyu germinate in the lower areas that a higher water table, the panic and Rhodes germinated well in the higher sands and the Rhodes also germinated in areas that had higher amounts of gravel.

What worked: The perennials have increased the productivity of the farm by boosting summer feed. Since the perennials have been planted they have reduced the amount of water erosion occurring through the lower lying paddocks by holding the surface soil together. Not only have the perennials had major positive impacts on feed and soil stabilisation they also improve the outlook of the farm in summer months as there is now always green cover.

What didn't work and what would you do differently: Some areas that were seeded to perennials did not take off, and in particular one small paddock had no perennial grasses survive. This paddock was luckily small and can be sacrificed by Vern as a holding paddock. Although Vern is very happy with the project he was a little disappointed that not as much panic grass germinated, however it is slowly spreading and thickening up. If he was to re-do the project he would change the ratio of the seed mix and target an increased amount of kikuyu in the lower lying areas, more panic amongst the deep sands and more Rhodes in the gravelly areas. This would just provide less loss and waste of seed.

Site Photographs:

25/01/2013

Photo 1

25/01/2013

Photo 2

17/05/2017

25/01/2013

17/05/2017

Photo 3

25/01/2013

17/05/2017

Photo 4

25/01/2013

17/05/2017

Photo 5

Name: Shane Nixon	**Site/farm Location:** Coomberdale
Project Type: Perennial Pastures	**Soil Type:** Poor sand
Project Year: 2012	**Funding Body:** Caring For Our Country.

Project Overview: Shane had issues with wind erosion over his bare, sandy, non-wetting paddocks. He struggled to get any cover over these paddocks in the summer and they were getting further degraded. He grazes cattle on the property so he was interested in getting the perennials growing on the property to boost his summer feed while also creating protection from the wind erosion.

He had varying germination rates after they were sown, with an overall failure rate of 95%. He re-seeded the following year applying a wetting agent with the seed. He had a much better survival and germination rate after this and the perennial have been able to grow and provide cover and feed.

What worked: Although the perennials did not survive in the first year, once Shane reseeded with the wetting agent he has had success from the perennials. He says that they have created great coverage over the paddock, and therefore reduced the amount of wind erosion, and he now has abundant feed in the summer months.

What didn't work and what would you do differently: The greatest failure of the project was the initial year of seeding with no wetting agent. Once he added that with the seeding the perennials succeeded.

Site Photographs:

Photo Point 1

7/02/2012

Photo 1

27/03/2017

7/02/2012

Photo 2

27/03/2017

7/02/2012

Photo 3

27/03/2017

Photo Point 2

7/02/2012

Photo 4

27/03/2017

7/02/2012

Photo 5

27/03/2017

7/02/2012

Photo 6

27/03/2017

Phil Barrett-Lennard (perennials consultant) giving Shane advice 2010

Name: James Redford]**Site/farm Location:** Red Gully

Project Type: Perennial Pastures **Soil Type:** Average sand

Project Year: 2013 **Funding Body:** Caring For Our Country.

Project Overview: The paddocks that were put to perennials on James' property would be bare and unproductive in the summer months. The paddocks had no protection from heavy summer rainfalls and would be prone to great amounts of runoff. James wanted to boost the productivity of his land and be able to graze all year round without having to supplement as much as possible while also protecting it from water erosion.

He seeded the paddocks to the northern tropical mix which included Panic and Rhodes grasses. He used a point seedier to a depth of 55mm with rows at 14 inch widths. From this he had a reasonably good germination rate of between 70—80% and found that germination was worse where there was already established ground cover.

What worked: James was very happy with the project as the perennials germinated and gave very good coverage to his otherwise sandy, bare paddocks in summer. He now has the ability to feed all year round on green grass. James also spread serradella out across the perennial paddocks the year after seeding and this was able to establish due to the greater soil stability and structure and provide extra feed and nitrogen to the system.

What didn't work and what would you do differently: James was very happy with the outcomes of the project. The only negative was that there was very limited survival in areas that already have ground coverage established. Luckily these areas were limited and he had a good take regardless. If he were to put perennials in again the only thing that he would change would be to seed them using a disc seedier to reduce the risk of sand falling back over the seed and suffocating it, and would seed them with 22 inch row spacing rather than 14 inch.

Site Photographs:

26/04/2013

Photo 1

9/05/2017

26/04/2013

Photo 2

9/05/2017

Name: Steve Slater	**Site/farm Location:** Gingin
Project Type: Perennial Pastures	**Soil Type:** Poor/average sand
Project Year: 2010	**Funding Body:** Caring For Our Country.

Project Overview: Steve wanted to put perennial pastures on his property to improve the grazing capacity. The area was limited in what other grasses would grow hence he thought trying perennials would boost the grazing, particularly in the summer months. Steve used a Duncan Seeder to put in his perennials and had a limited germination after the first year, however after 2011 the perennials went very well. Steve put in a large area of 109 ha.

What worked: Steve found the project extremely successful. After getting a good season in 2011 he had great growth of all the perennials. This project greatly increased the properties grazing potential and allowed him to be able to graze all year round. Steve also found that getting involved with the project opened his mind up to other opportunities of improving the grazing potential of land and got him involved in other areas of research and development in agriculture.

What didn't work and what would you do differently: Steve would have liked to have seen a little more information given out about site preparation. Since doing the project Steve realised how important it is to prepare the site properly, and would have put more effort into that if he had known earlier. He would also have been interested in seeing if there were more varieties that could be well suited to the area.

Site Photographs:

***Steve is no longer on the farm so recent photos could not be obtained.*

18/04/2011

6/07/2012

18/04/2011

6/07/2012

6/07/2012

Name: Lindsay Timms **Site/farm Location:** Red Gully

Project Type: Perennial Pastures **Soil Type:** Poor/average sand

Project Year: 2013

Funding Body: Caring For Our Country.

Project Overview: Lindsay had very limited summer feed on his property and was interested in perennials to increase his summer productivity. Lindsay runs sheep on his property and had few areas during summer where he could graze them. Lindsay would not have put perennial pastures onto his property if the incentive program had not become available. He had heard great success stories of perennial pastures and thought that he would have great summer feed and would only need limited amounts of supplemented feed.

He put in a the northern tropical mix of panic, Rhodes and kikuyu, with one paddock had veldt grass in the mix. The year of planting was very dry and Lindsay had very limited germination of the panic and Rhodes grasses (approximately 15%). The veldt grass and kikuyu had very good germination of between 70-80%.

What worked: Lindsay has been happy with the project and the germination of the veldt and kikuyu in particular. This has allowed him much more summer feed than he usually has. Although the germination of the panic and Rhodes was minimal the productivity from the few plants that have survived has been noticeable. Lindsay has also found one of the most successful aspects of the project is the knowledge he gained on perennial pastures and sheep fodder.

What didn't work and what would you do differently: Although the perennial pastures did improve the productivity of the land it has still been disappointing for Lindsay that there was such small amounts germination of the panic and the Rhodes grasses. He had hoped to get great germination from the whole mix. This is due to the non-wetting aspect to the sandy soils and he would attempt to address this better if he re-did his perennial pasture, either by trying different wetting agents or trying claying. Because of the success of the veldt grass he would have preferred a higher percentage of this in the mix.

Site Photographs:

19/04/2013

Photo 1

12/05/2017

19/04/2013

Photo 2

12/05/2017

Name: Clive Tonkin **Site/farm Location:** Coomberdale

Project Type: Perennial Pastures **Soil Type:** Poor/average sand

Project Year: 2012

Funding Body: Caring For Our Country.

Project Overview: Clive planted this paddock to perennials as he wanted to keep the paddock covered and needed to increase the summer grazing productivity. The paddock had very limited cover, was very exposed to wind erosion and had no feed during the summer months. By planting to perennial pastures Clive hoped to reduce the amount of wind erosion across the paddock, and hence stabilise the soil, and hoped to boost his grazing potential during the summer months. Clive had a sub-tropical mix planted and initially had a good germination of >75%.

What worked: The perennial pastures were successful in the first three years after an initial good germination. The pasture was great feed for the sheep and was needed in the summer months. In these years the paddock suffered less from wind erosion as it had year round cover.

What didn't work and what would you do differently: The perennials were great for the first few years however the majority of them died out in the very dry summer in early 2016. Clive would not alter anything about the project, it was just a shame he had a bad summer.

Site Photographs:

6/02/2012

Photo 1

30/03/2017

6/02/2012

Photo 2

30/03/2017

Name: Brad Tonkin **Site/farm Location:** Coomberdale

Project Type: Perennial Pastures **Soil Type:** Poor sand

Project Year: 2011

Funding Body: Caring For Our Country.

Project Overview: Brad had previously cropped this paddock, however the poor sand was not returning any good yields so he decided to just us it for grazing. The paddock would therefore lay bare for a number of months and would be impacted by strong winds blowing across it. He was interested in growing perennials to be able to enhance the grazing potential of this paddock and to keep some cover over it all year round to stabilise the soil.

He seeded it himself and had a very good germination and survival rate of approximately >90%. He made sure to prepare the paddock well and apply fertiliser. Since planting he gets continued growth and coverage over the paddock. He had just recently taken sheep out of the paddock after having them graze it for a few weeks.

What worked: Brad has found the project very successful. He has year round feed and coverage over this paddock. Brad was impressed with the rate that the perennials grew and the rate that they continue to grow back. Because of the poor performance he had from cropping he did not expect the project to be this successful. The paddock is now stabilised and provides great grazing.

What didn't work and what would you do differently: Brad had no negative feedback about the project.

Site Photographs:

Photo Point 1

24/01/2012

Photo 1

27/03/2017

24/01/2012

Photo 2

27/03/2017

Photo Point 2

24/01/2012

Photo 3

27/03/2017

24/01/2012

Photo 4

27/03/2017

24/01/2012

Photo 5

27/03/2017

2012

Name: Martin Van Beek

Site/farm Location: Koojan

Project Type: Perennial Pastures

Soil Type: good sand

Project Year: 2011, 2010 & 2012

Funding Body: Caring For Our Country

Project Overview: Martin underwent three different perennial pasture projects over three years. He targeted the planting of the perennials on areas that were very susceptible to wind erosion and struggled to grow any feed during the summer months. The aim was to increase the productivity of the land and to protect and stabilise the soil.

Martin seeded a sub-tropical mix of grasses, primarily being rhodes and panic grasses. He had good survival rates across all three sites, all varying across themselves with ranging between 60-90% survival rate.

What worked: Martin has been very happy with the results of the three projects. The paddocks don't blow away after strong winds in the bare summer months anymore, hence much improved soil stability. He is also getting good amounts of summer feed. He grazes on a rotational basis now that the perennials are planted. He rotates depending on the seasonal rainfall, keeping an eye on the pastures to see when to move the sheep along.

What didn't work and what would you do differently: He has noticed that the rhodes grasses are not as palatable as the panic. The panic is always eaten down before they touch the rhodes. This can create an issue as the sheep often need to be moved on before they get to eating down the rhodes to ensure the panic doesn't get too heavily grazed. Martin would be interested to see how the perennial pastures would perform if there was more panic, less rhodes, different variety of Rhodes, or a different seed mix altogether.

2010 Site Photographs: 26/04/2017

*** no 'before' photos are available*

2011 Site Photographs: 26/04/2017

2012 Site Photographs: 26/04/2017

Name: Kevin Williamson

Site/farm Location: Gingin

Project Type: Perennial Pastures

Soil Type: good red sand

Project Year: 2012

Funding Body: Caring For Our Country

Project Overview: Kevin runs cattle on his property and got involved in the perennial pastures project to increase the amount of feed he has during the summer months. He had a sub-tropical grass mix planted of rhodes and panic grasses. The overall germination was good with a survival rate of approximately 80%. There were still bare patches across the paddock, however over the years since the project these have been covered as the grass seeds spread around. He had an aim of being able to provide feed for his cattle year round and limit the amount of supplementary feed required.

What worked: Kevin said that the project was very positive. He now has coverage over his paddock year round, and an excess of feed.

What didn't work and what would you do differently: Kevin had no negative feedback about the project. He would like to put in more rhodes grass in the mix as this germinates easier than the panic grasses.

Site Photographs:

Photo Point 1

21/12/2012

Photo 1

5/05/2017

21/12/2012

Photo 2

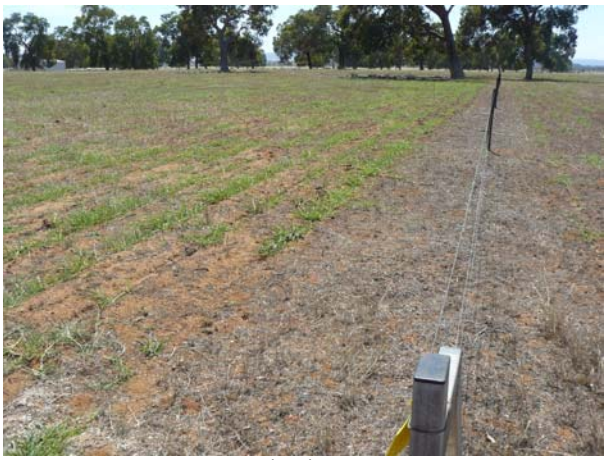
5/05/2017

21/12/2012

Photo 3

5/05/2017

Photo Point 2



21/12/2012

Photo 4

5/05/2017

21/12/2012

Photo 5

5/05/2017

21/12/2012

Photo 6

5/05/2017

Name: Roger Small	**Site/farm Location:** Gingin
Project Type: Perennial Pastures	**Soil Type:** Average sand
Project Year: 2011	**Funding Body:** Caring For Our Country

Project Overview: Roger grazed cattle on his property and struggled for sufficient summer feed. He got involved with the perennial pasture incentive project so that he could boost the productivity of his property through the summer months. He had the sub-tropical mix seeded, a mixture of panic and Rhodes grasses. He had very good germination after seeding, particularly due to a good rain in February the year following seeding.

Roger has since left the property, however the paddocks had very good coverage for the years after that he was there. He implemented a rotational grazing system with one or two weeks of grazing per paddock, depending on the season, and then left for a few weeks for the grasses to grow back.

What worked: Roger was very happy with the germination that he got and the amount of summer feed that the perennials provided. The project was successful for what he needed it for.

What didn't work and what would you do differently: Roger had no negative feedback about the project.

Site Photographs:

23/04/2013

Photo 1

29/05/2017

23/04/2013

Photo 2

29/05/2017

14/11/2011

Photo 3

29/05/2017

Name: Jim Armstrong **Site/farm Location:** Koojan

Project Type: Perennial Pastures

Soil Type: Poor/average sand and gravel **Project Year:** 2013

Funding Body: Caring For Our Country

Project Overview: Jim had limited summer feed over his property, hence was interested in planting perennials to provide this. Jim used the sub-tropical mix with a mixture of panic, rhodes, kikuyu and a tall couch variety. Jim had two areas he wanted sown, aa 14ha area and a 30ha area. He is an organic farmer and implemented different paddock preparation to other farmers that have been involved with the project. To get the paddock ready he heavily grazed them with sheep to reduce the weeds. This was successful in the 14ha area however not in the larger 30ha area. Jim applied a contingency plan and seeded the perennials to a different 30ha paddock with better weed control however had very shallow sand over gravel, not as suitable for perennials.

Jim had great germination in both areas planted and had good summer feed for the following years. The perennials in the 13ha area continue to survive and grow well, but those in the 30ha area have struggled in recent years.

What worked: Jim has found the project very successful. He has had great amounts of summer feed in the years following the project. The paddocks have both had great coverage of feed, all of which the sheep graze. The fencing included in the project was also extremely helpful to break the paddocks into manageable sizes for rotational grazing.

What didn't work and what would you do differently: After a number of years Jim found the panic and rhodes grasses began to die out on the larger 30ha area that was seeded. He knows this is due to the shallow underlying gravel and would have preferred to have grown it in the original paddock. In future Jim would be sure to get the weeds under control to be able to plant in the more suitable area. Jim would also put more panic grass into the seed mix as the sheep prefer to eat this over the rhodes.

Site Photographs: taken 24/05/2017

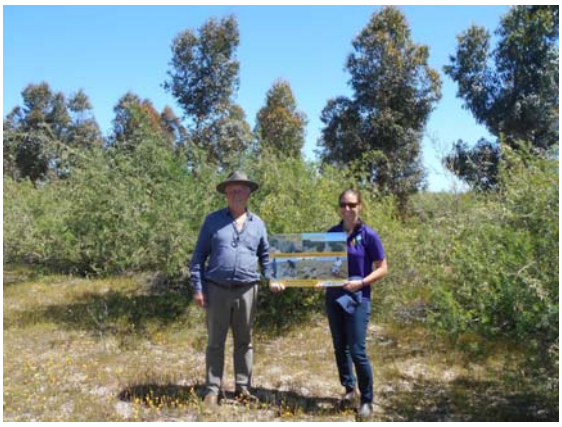
*** no 'before' photographs available*

Name: Tony Ruse **Site/farm Location:** Gingin

Project Type: Perennial Pastures **Soil Type:** Average sand

Project Year: 2010 **Funding Body:** Caring For Our Country

Video interview link: https://youtu.be/lqAFjg4wMG4



Project Overview: Tony's perennial pasture project involved the planting of tagasaste as shelter belts across the paddock. The Tag was the first step for tony in stabilising the previously barren and overgrazed paddock by protecting the sandy topsoil from strong winds and to help create a more stable soil profile and improve the soil biological health. Tony has since begun to sow perennial grasses between the rows of tag to increase the amount of feed in the paddock for livestock . Eventually Tony wants to minimise inputs to create a self-sustaining system.

The actual planting of the tagasaste went very well and there was a great survival rate of >90%. Since the planting of tag Tony has sown a number of rows of perennial grasses (Rhodes and panic) mixed with lines of serradella.

What worked: The tagasaste has been a great success for Tony in creating wind breaks across the paddock. The tag grew very well since the planting and can also double as sheep feed. The improvement in the soil stabilisation can already be noticed as the perennial grasses are growing reasonably well in the inter-rows and not getting covered by blowing sand as the would have been previously. The planting of the tag has been the first step taken in addressing the many issues that grazers have on sandy, windblown paddocks.

What didn't work and what would you do differently: Although the tag has been a great success for Tony he would prefer a mixed species planting of the shelter belts to increase biological diversity above and below ground. The tag can also become hard to manage in years to come when it grows taller and wider. It can become costly to cut it back if it is to be kept at a sheep grazing size.

Site Photographs:

15/04/11

Photo 1

12/10/17

15/04/11

Photo 2

12/10/17

Name: Moora Citrus	**Site/farm Location:** Moora
Project Type: Perennial Pastures	**Soil Type:** Good sand/Loam
Project Year: 2010	**Funding Body:** Caring For Our Country

Project Overview: The perennial pastures were sown between rows at the Moora Citrus orange orchard. They were planted here to create a cooling effect and increase the biological health of the soil between the rows of orange trees. This is to improve the overall soil conditions and was also an attempt to attract more bugs, an integral part of the pollination.

The perennials were planted in the inter-rows of the orange trees and were irrigated in the first two years after planting. They had a great survival rate, and with the help of the irrigation in the early years established very well. They no longer get irrigated however still remain very healthy.

What worked: The perennials have grown and established very well over the years since seeding. They have done as expected and helped to cool the soil and have attracted a great variety of bugs and insects to the soil and orchard, increasing the biological health. The perennials have also reduced the amount of erosion between the rows of the orange trees. Previous to planting there was extra maintenance required to the rows to allow for the orchard machinery to easily drive through. Having the perennials has resulted in less time needed to be spent on this upkeep.

What didn't work and what would you do differently: Although the perennials have reduced the upkeep of the rows in terms of the eroding surface, the grasses need to be mowed a number of times a year. However this is less maintenance than was required before the seeding of perennials. The Rhodes grass in the perennial mix can be an issue when the runners are not maintained appropriately and grow into the sprinkler heads, with proper management though this is often avoided. If there was a naturally short growing grass with no runners that would be the perfect perennial to grow in the inter-rows and could even be grown closer under the trees for added benefits.

Site Photographs: ***Taken 12/10/2017***

Name: John Isbister **Site/farm Location:** Moora

Project Type: Perennial Pastures **Soil Type:** Average Sand

Project Year: 2012 & 2013 **Funding Body:** Caring For Our Country

Video interview link: https://youtu.be/LS6EG_rSxN8

Project Overview: John was involved in two perennial pastures projects over two years. Both areas planted to the perennials are paddocks of average, non-wetting sands primarily used for grazing sheep. John was interested in planting the perennial pastures to increase the productivity of the paddocks and to decrease and prevent any further degradation of the sandy paddocks from wind erosion.

John seeded the area to the northern perennial mix of Panic Gatton and Rhodes grasses. He prepared the paddocks by spading , spraying weeds and planting serradella in the year leading up to seeding the perennials. This was to give the pastures the best chance possible at taking off. After seeding he was lucky to have some good showers of rain to ensure that the pastures germinated. John had >90% survival rate at both sites, however the 2013 pastures had the greatest success.

What worked: John has been very pleased with the success of the perennial pasture project. The mix of perennials has proven to be great sheep feed. Having prepared the two sites appropriately he gave the perennials the best possibility to be successful. Spading the paddock was particularly crucial to the success of the perennials by mixing the non-wetting sandy material with deeper clayey sand. John has now greatly increased his summer feed which has been extremely beneficial to his grazing system through particularly dry years. The perennials have also protected the soil from further wind erosion and have created shelter during lambing. Having green pastures throughout the dry summer months has also been beneficial aesthetically.

What didn't work and what would you do differently: Although happy with the project John understands that seeding perennial pastures can be risky if the right conditions are not received. John was lucky to have a good rain after seeding and also prepared the paddock well. If not enough rainfall the paddock is at the risk of being left bare and susceptible to wind erosion. The sheep do preferentially graze certain areas and prefer the panic grass which can make it difficult to know when to rest the paddock. John would prefer to put in a higher percentage of panic.

2012 Site Photographs:

Photo Point 1

15/01/13

Photo 1

19/10/2017

15/01/13

Photo 2

19/10/2017

15/01/13

Photo 3

19/10/2017

Photo Point 2

15/01/13

Photo 4

19/10/2017

15/01/13

Photo 5

19/10/2017

2013 Site Photographs:

Photo Point 1

15/01/13

Photo 6

19/10/2017

15/01/13

Photo 7

19/10/2017

15/01/13

Photo 8

19/10/2017

Photo Point 2

15/01/13

Photo 9

19/10/2017

15/01/13

Photo 10

19/10/2017

Name: Jim Hamilton **Site/farm Location:** Moora

Project Type: NyPa Grass **Soil Type:** Sandy loam

Project Year: 2015

Funding Body: NACC—National Landcare Program

Project Overview: The NyPa grass was planted around a dry salt lake on the Hamilton's farm just west of Moora. They had huge issues with strong winds blowing the silty salt lake material across the paddock. As this silty, salty material gets blown cross the paddock it forms a salty surface layer over the paddock, increasing the salinity and making it difficult to yield a good crop. Jim was very keen to get something to cover the lake to grant some protection from the wind and to reduce the amount of the material blowing over the lake.

The NyPa grass was planted in a 10 ha area around the edges of the lake where nothing else would grow due to the high concentration of salt. The NyPa grass was trialled here as it is known to be able to abstract the salt out of the soil and store it in the plant through it's deep root system. With these characteristics it was hoped that the NyPa would survive and grow to stabilise the lake edge and reduce the amount of the silty, salty residue blowing onto the paddock.

The NyPa was planted by hand at three varying densities, 1, 2 and 4m apart. Admittedly Jim says this planting was a little rushed and could have been done better. The overall survival rate of the NyPa grass was very poor, approximately <20% as the rainfall in the year to follow was very low. The grasses planted 1m apart have had better survival rate in comparison to plants that were planted 2 and 4m apart.

What worked: Some of the NyPa grass has survived and is growing healthily, in time these areas will hopefully thicken up and spread further around the lake. It shows that the NyPa grass can grow around the highly saline lake if the density of planting is correct.

What didn't work and what would you do differently: The biggest issue with the NyPa grass was the lack of rainfall in the year after the planting. The NyPa grass is perfect to grow in very salty ground, however needs a lot of water to survive. If done again Jim would plant the NyPa grass at higher densities all the way around the lake. This would hopefully speed up the stabilisation of the lake edge.

Site Photographs:

25/08/2015

Photo 1

22/03/2017

25/08/2015

Photo 2

22/03/2017

6.0 Strategic Revegetation

6.1 Project overview

The aim of the strategic revegetation projects was to address issues with wind erosion. The revegetation sites were in targeted areas that were either suffering from wind erosion or were in strategic areas to minimise wind erosion across the landscape. The sites chosen for this strategic revegetation had to be previously cleared land , a minimum of 5 ha and must be entirely fenced off. By targeting these areas it was hoped that the revegetation would reduce in situ and surrounding wind erosion with an added bonus of increasing biodiversity of natural vegetation and create native habitats.

An area strategically revegetated where wind erosion was a constant issue for the farmer.

6.2 Summary of Projects

All those involved in the strategic revegetation projects have been very happy with the results. The areas of plantings have already reduced the amount of wind erosion at the sites and the erosion of the surrounding areas. Each farmer who took up the strategic revegetation project was also happy with the increase in biodiversity on their farm. Overall the project was a successful one, and there has been more interest in increasing the revegetated areas, not only for wind erosion but also to address creek line degradation and habitat loss. One major benefit noted from all farmers is the aesthetic improvement of the landscapes.

Revegetation site out of Yerecoin

Revegetation site near Moora

6.3 Recommendations

- Keep the fencing around the revegetated site in good condition, particularly in the first few years after planting. This will make sure livestock do not eat the seedlings.
- Make sure the site of the revegetation has decent soil conditions so that the seedlings have a chance to survive.
- Infill areas that had lower survival rates to create greater biodiversity.

6.4 Strategic revegetation site inspections

Name: David Glasfurd **Site/farm Location:** Moora

Project Type: Strategic Revegetation

Soil Type: Deep Loam

Project Year: 2012 & 2013

Funding Body: Caring for our Country

Video interview link: https://youtu.be/dWn7euiGmx4

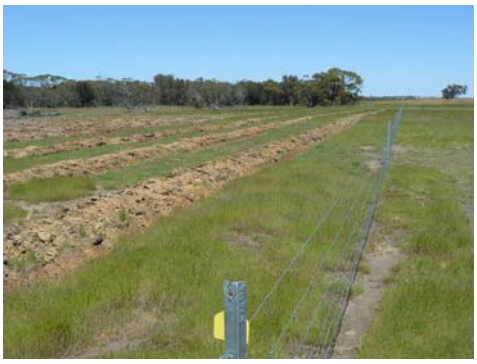
Project Overview: The creek line running through David's property was getting degraded as a result of sheep grazing, water runoff and lack of vegetation to hold the soil together. The creek line was bare apart from weed grasses. David revegetated this area in 2012 and continued to revegetate a different area of the creek line, along with a runoff channel in 2013. This runoff channel had previously been cropped however was getting too waterlogged. David wanted to revegetate the area to create a healthier system in the creek line with reduced degradation, to stop increased waterlogging around the runoff channel and also to extend wildlife corridors and create a more aesthetically pleasing outlook along the creek line.

The planting of both sites went very well. David put in a mixture of native plants, and also planted some saltbush throughout. The 2012 site had a great survival rate of >85%. After the planting of the 2013 site David had an issue with some sheep getting in and eating down the seedlings. This luckily this did not have a detrimental impact and the following year the seedlings shot up and grew well, this site had an overall survival rate of approximately 80%.

What worked: The revegetation and fencing off of the creek has allowed it to stabilise and has reduced degradation. The native vegetation is thriving creating native habitat for wildlife and some plants are even self seeding. David was particularly happy that the 2013 had any survival after the sheep got in. The creek line has also been transformed aesthetically and attracts a huge population of birds including Wrens and Kingfishers.

What didn't work and what would you do differently: According to David there have been no negatives to this project, apart from the issue with the sheep getting into the newly planted area.

2012 Site Photographs:



8/10/2012

Photo 1

12/04/2017

8/10/2012

Photo 2

12/04/2017

2013 Site Photopoints:

9/9/2013

Photo 3

12/04/2017

2013

Name: Graham & Hugh Johnson **Site/farm Location:** Piawaning

Project Type: Strategic Revegetation

Soil Type: Deep Loam

Project Year: 2013

Funding Body: Caring for our Country

Project Overview: The area that was revegetated was previously cropped by Hugh and Graham however was becoming more saline and yields were not profitable. The area is relatively low in the landscape and ran the risk of increasing in salinity. By revegetating this area Graham and Hugh hoped to stop any spread of salt and degradation of adjacent arable land. The area was strategically chosen as it also links up bushland on a neighbouring property to create a larger wildlife corridor.

Graham was strategic on what species he chose to plant and where. The planting went well however they had mixed results in terms of survival. The year after the planting was dry and hence some seedlings struggled. Hugh and Graham had an overall survival rate of approximately 75%, less than what they had hoped for.

What worked: Graham and Hugh have been happy that the plants have survived and grown in the area. The revegetated areas have helped in slowing the spread of salt to arable land. The variety of species planted has also been a success by increasing the biodiversity on the farm. The revegetated site has linked up the bushland on the Johnson's property with the neighbours property, creating a bigger wildlife corridor. Once the plants mature this will attract even more native wildlife and birdlife back.

What didn't work and what would you do differently: The only issue with the project was the timeline for getting the fencing up around the revegetated area. However they understand this was required to ensure protection of the seedlings from grazing.

Site Photographs:

21/03/2013

Photo 1

10/04/2017

21/03/2013

Photo 2

10/04/2017

Photo 3

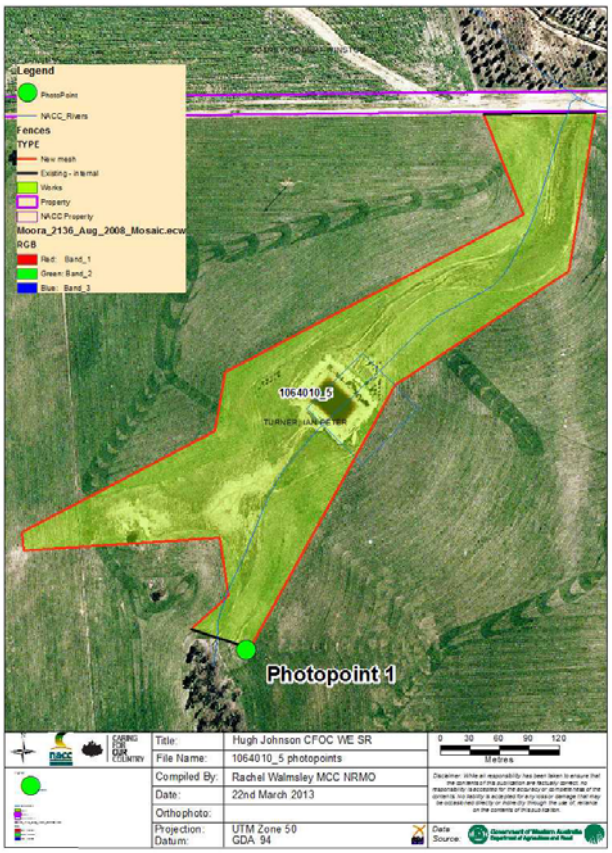
21/03/2013

10/04/2017

Photo 4

21/03/2013

10/04/2017



Name: Dave Isbister **Site/farm Location:** Moora

Project Type: Strategic Revegetation

Soil Type: Gravelly loam

Project Year: 2012

Funding Body: Caring for our Country

Project Overview: The area that was revegetated on Dave's property was a rundown gravel hilltop. Dave never cropped this section of his farm and wanted to revegetate it to it's natural environment to increase the on farm biodiversity and habitat for native birds and animals. Dave hoped that by planting the native vegetation and fencing it off from sheep the plants would eventually re-seed themselves and thicker bush would eventually establish.

The planting phase of the project went well, however was tough travelling over the gravel ground on the tree planter. Approximately 90% of the seedlings planted survived. Dave hoped that once these seedlings have established not only would the area be great native habitat, but also it would improve the aesthetics of the landscape.

What worked: The revegetating of the hilltop has increased the diversity of plants on the property and has improved the area as a corridor for birds and other native wildlife. The survival of the seedlings has been great, and the improved aesthetics of the area has already made a difference. With no other profitable use for the area for Dave revegetating was the best use of the land.

What didn't work and what would you do differently: The only negative of the project was the difficult and bumpy planting of the seedlings, otherwise the project was very successful for what Dave wanted to achieve.

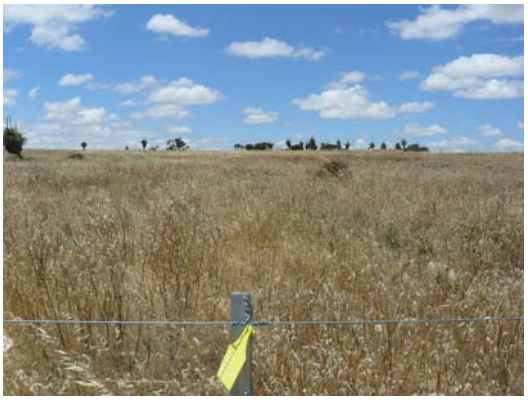
Site Photographs:

Photo Point 1

14/12/2012

Photo 1

29/03/2017



14/12/2012

Photo 2

29/03/2017

14/12/2012

Photo 3

29/03/2017

Photo Point 2

14/12/2012

Photo 4

29/03/2017

14/12/2012

Photo 5

29/03/2017

14/12/2012

Photo 6

29/03/2017

Name: Jim Hamilton

Site/farm Location: Moora

Project Type: Strategic Revegetation

Soil Type: yellow sand over clay

Project Year: 2012

Funding Body: Caring for our Country

Project Overview: The strategic revegetation project on the Hamilton's farm was aimed to protect the soil from strong winds by creating a windbreak for the surrounding paddocks. The area was previously cropped however was happily sacrificed as it was along the fence line and edges of the paddock. Jim targeted the planting in areas of the paddock that backed onto bare salt lakes to also reduce the amount of salt material blowing onto the paddock. By planting here Jim hoped to create a wind-break that would help in protecting the topsoil of the paddock. Revegetating to native vegetation would also increase the bio-diversity and habitat on the farm.

Without the incentive program the Hamilton's would not have done the revegetation. A variety of native vegetation was plant-ed and approximately 70% of the seedlings have survived.

What worked: Jim has been happy with the survival and growth of the seedlings. Those that did survive grew well and have been pivotal in stopping the excessive blowing of the paddocks. The trees have created protection for the paddocks and also allow for improved soil health and stability.

What didn't work and what would you do differently: Jim had no negative feedback about the project.

Site Photographs:

Photo Point 1

3/02/2012

Photo 1

24/03/2017

3/02/2012

Photo 2

24/03/2017

Photo Point 2

3/02/2012

Photo 3

24/03/2017

3/02/2012

Photo 4

24/03/2017

3/02/2012

Photo 5

24/03/2017

3/02/2012

Photo 6

24/03/2017

Name: Gary & Wayde Parker

Site/farm Location: Marchagee

Project Type: Strategic Revegetation

Soil Type: Sand over gravel

Project Year: 2012

Funding Body: Caring For Our Country.

Project Overview: Gary and Wayde have had big problems on their property from wind erosion over the sandy paddocks which has previously created blowouts across the property. The area they focused on was revegetated to native trees and shrubs to act as a wind break. They sacrificed this area as it was the most impacted by the wind erosion. The revegetation would allow for better soil quality and higher yields over the surrounding paddock by decreasing the extent of wind erosion.

Gary and Wayde planted a mix of native plants and had mixed results over the area planted. They had >70% survival rate, however some seedlings struggled to take of and have not grown as quickly as Gary and Wayde had hoped.

What worked: Wayde and Gary have been happy with the project and the way that it was run out. The seedlings have grown slowly are will thicken out more in coming years. By planting where they have Wayde has said that the amount of wind erosion has decreased significantly and the sol is holding together much better.

What didn't work and how would you do the project differently: This project has been successful in reducing the amount of wind erosion, however the survival rate was a little lower than Gary and Wayde had hoped for. The area has recently been burnt, accidentally, however the fire was not severe and it is hoped that the bush regenerates and comes back thicker than before. Gary and Wayde have recently gone out of sheep and consider the fencing around the project now unnecessary and in hindsight would not have worried about putting it up.

Site Photographs:

6/6/2013

Photo 1

13/04/2017

13/04/2017

13/04/2017

Name: Clive Tonkin **Site/farm Location:** Coomberdale

Project Type: Strategic Revegetation **Soil Type:** Sand over gravel

Project Year: 2010

Funding Body: Caring For Our Country

Project Overview: Clive was keen to get involved with the strategic revegetation project to connect up bits of existing vegetation across a part of his paddock along a fence line. He was interested in increasing the biodiversity and in creating a wildlife corridor. He also wanted to revegetate this area to provide shade for sheep. He hoped that the trees and shrubs would grow and thicken up and improve the aesthetics of the paddock. Clive had a very low survival rate across the site after planting. There was a better survival rate in the eastern area of planting, however very low in the south western section where the soil was much drier.

What worked: While most seedlings did not survive the few that did have increased the biodiversity and have created s a small habitat for native wildlife. These survivors also have been providing shade for the sheep in the paddock.

What didn't work and how would you do the project differently: The biggest let down for Clive is the very low survival rate. He thinks the sand was too shallow and dry. The season following the planting was also very dry and limited the growth. In the future he would pick out a different area of the property to plant to native vegetation that had better soil conditions.

Site Photographs:

Photo Point 1

Photo 1

23/11/2010

30/03/2017

Photo 2

23/11/2010

30/03/2017

Photo Point 2

23/11/2010

Photo 3

30/03/2017

23/11/2010

Photo 4

30/03/2017

23/11/2010

Photo 5

30/03/2017

Name: Sarah Mason

Site/farm Location: Calingiri

Project Type: Strategic Revegetation

Soil Type: Loam, some gravel

Project Year: 2011 & 2012

Funding Body: Caring For Our Country

Project Overview: Sarah's property was only recently cleared in the early 1980's. There is already some good stands of remnant vegetation areas which Sarah wanted to connect up to create wildlife corridors. Although the property is at the top of the surrounding landscape the salt concentration was increasing within the valleys. By revegetating Sarah hoped to slow down/ mitigate this process.

The 2011 site was done on a part of the farm that had been cleared earlier than the 1980's. This revegetation is along a creek line which was increasing in salt concentration. Here the revegetation was done to thicken up this area that still had remnant trees with more understorey shrubs that could survive amongst salt. The 2012 site was done across an area that had previously been cropped but was often waterlogged and was in a key spot to link up two remnant bushland areas. The 2011 site had good survival rates of the shrubs, however some on the very salty ground struggled. The 2012 site had very good survival rates of >80% in the down gradient areas, however a very low survival rate in the up gradient area of <50%.

What worked: Sarah has found the projects very successful to create a better overall natural system on the farm. The portion of the funding that went towards fencing has been particularly helpful to be able to keep livestock out of the bush to allow it to take off. Where the shrubs and trees have survived they have created great habitat and linked up more bushland across the landscape. The area that was waterlogged now has vegetation growing over and has reduced the risk of waterlogging spreading out to the surrounding paddock. The vegetation along the creek line has improved the outlook and health of the creek. The vegetation has been able to survive on the salty ground and will slowly keep growing to improve the area further.

What didn't work and how would you do the project differently: For Sarah the only disappointing part of the project is that the up gradient portion of the 2012 revegetation did not survive that well. This could have been due to a number of factors including there being more weed competition, being drier and having more gravel at surface. Sarah would get the weeds in this area under control more if she replanted here. This being said the actual project was a success for Sarah.

2011 Site Photographs: taken 24/05/2017

*** there are no 'before' photos available.*

Photo Point 1

Photo Point 2

2012 Site Photographs: taken 24/05/2017

Name: Tony Ruse **Site/farm Location:** Gingin

Project Type: Strategic Revegetation **Soil Type:** Sand

Project Year: 2012

Funding Body: Caring For Our Country

Video interview link: https://youtu.be/lqAFjg4wMG4

Project Overview: The strategic revegetation site on Tony's property was across a previously overgrazed, sandy paddock. The revegetation was done so to create shelter belts across the paddock to protect the sandy paddock from blowing away, to create extra shade and to increase the biodiversity of the farm. The shelter belts were designed to be able to seed perennial pastures between the enhance the grazing capabilities of the land. By protecting the paddock from the wind and creating extra shade to cool the soil Tony hoped to increase the soil biological health and create a near self-sustaining system.

The planting of the seedlings went very well and temporary fences were put up the protect the seedlings in the first few years of growth. Unfortunately since the year of planting (2012) the diversity of the seedlings that have survive is very low with mostly only acacias surviving.

What worked: The plants that have survived and grown well (the acacias) are already creating good breaks for the strong gusts of wind and are therefore stabilising the soil. The acacias are creating shade and already soil health is improving. Tony will replant areas of the shelter belts where not many seedlings survived to enhance this effect.

What didn't work and how would you do the project differently: There was limited survival of a diverse range of seedlings. Having this diversity is key for Tony and he would have been pleased to see more survive. The years following planting there were issues with wingless grasshoppers , so if more seedlings were planted they would need to be so with some sort of protection from these.

Site Photographs:

7/4/2010

Photo 1

12/10/2017

7/4/2010

Photo 2

12/10/2017

Name: Alex Keamy

Site/farm Location: Watheroo

Project Type: Strategic Revegetation

Soil Type: Sand

Project Year: 2011

Funding Body: Caring For Our Country

Project Overview: The revegetation on the Keamy's property was done over a 10ha area along a fence line. This revegetation was done to create a wind break across the paddock to protect from strong winds blowing out the sandy paddock. By planting the native seedlings in this location it would allow for better soil stability and therefore improve and enhance the crops grown.

The planting phase went well with a diverse range of species. Over 90% of the seedlings planted survive and these continue to survive grow today.

What worked: With such a high survival rate and seeding in the strategic location chosen this project has already displayed benefits by decreasing the impacts of the wind blowing across the paddock. With time this protection will increase as the plants grow further.

What didn't work and how would you do the project differently: Although the benefits have been great Alex has had issues with weed control through the revegetated area which impacts the neighbouring crop. If the project was offered again Alex would be interested to mix in some fodder shrubs such as saltbush. This then would not only protect the paddock from wind erosion and increase diversity, but would also enhance the productivity through grazing benefits. Once plants are established sheep could run through the area and also benefit.

Site Photographs: ***Taken 11/10/2017***

7.0 Future Funding Directions

Over 50% of farmers interviewed were keen to get involved in future sustainable agriculture projects. Depending on the farming enterprise and the location the type varied across the Moore Catchment. The following are some of the types of projects that farmers were keen to get involved in:

- More saltbush—Many farmers had more salt land where they were keen to plant to saltbush.
- Anameka saltbush—The development of this has spiked a lot of interest.
- NyPa grass—Some farmers have extremely salty land that they would be interested in growing this on.
- Lebeckia, Messina and Tedera— The research and development of these are still ongoing however many grazers are very interested in trying them out.
- Creek line Revegetation—Many of the farmers are still interested in revegetation their creek lines.
- Feral animal control—Some farmers have noted increases in feral animal numbers, particularly foxes, in recent years.

8.0 Conclusion

From comparison of projects the most successful, with the greatest perceived profitability and productivity, has been the saltbush projects. The saltbush has transformed unused waste land areas into productive grazing ground, while decreasing the spread of salinity and controlling wind and water erosion. An overwhelming response from farmers interviewed was the positivity towards the work that Moore Catchment Council does with offering these types of projects. Not only do the projects deliver results, they spread knowledge out to farmers and have exposed them to opportunities to do this work that they otherwise would not have 'gotten round to doing'.

Moore Catchment Council would like to thank all the farmers who took part in this project, and gave up their time to be interviewed and show project sites on their farms. Thanks also to the supporters who helped promote this project and gather information for this report. They include the Moora-Miling Pasture Improvement Group, Yarra Yarra Catchment Management Group, Northern Agricultural Catchments Council, Bowman Brush, Kochii Eucalyptus Oil, CSIRO - in particular Hayley Norman, Chatfields Nursery, Phil Barrett-Lennard and Georgie Troup.

This report was compiled by Emma Pearse in 2017 on behalf of Moore Catchment Council, and funded through the National Landcare Program.

9.0 References

E.G Barret-Lennard, 2003, *Salt land Pastures in Australia, A Practical Guide*, Department of Agriculture, Perth.

Forest Products Commission, *Sandalwood,* n.d. available from : http://www.fpc.wa.gov.au/sandalwood [31 May 2017].

Forest Products Commission, *The Good Oil.* Available from: file:///C:/Users/User/Downloads/the-good-oil-wa-sandalwood.pdf [31 May 2017]

10.0 Farmer video interviews and useful links

Neil Pearse (Miling) Oil Mallees & saltbush projects https://youtu.be/iJfKZfJWU4M

Ian McGillivray (Koojan) Brushwood & fodder shrubs projects https://youtu.be/9ZFDLUPC-RU

Tony Ruse (Boonanaring) Perennial pastures & strategic revegetation projects https://youtu.be/lqAFjg4wMG4

Les Crane (Gabalong) Oil mallee, brushwood and Anameka saltbush projects https://youtu.be/DBKBSu4A-XU

John Isbister (Moora) Perennial pastures project https://youtu.be/LS6EG_rSxN8

David Glasfurd (Moora) Saltbush & strategic revegetation projects https://youtu.be/dWn7euiGmx4

Useful Links

- Bowman Brush –www.bowmanbrush.com
- Chatfields Nursery (Anameka Saltbush) - www.chatfields.com.au
- Ian Stanley (Kochii Eucalyptus) — 0428 910 351
- Kochii Eucalyptus Oil—www.kochiioil.com.au
- Moore Catchment Council – www.moorecatchment.org.au, Ph. 9653 1355
- NACC—www.nacc.com.au
- Australian Government's National Landcare Program—http://www.nrm.gov.au/
- Avon Gro—www.avongro.com.au
- Australian Sandalwood Network—www.sandalwood.org.au
- Growing Brushwood for Profit and Production—www.moorecatchment.org.au/projects/Brushwood_booklet.%20G.Troup_D.pdf
- Perennial pastures—www.agric.wa.gov.au/pasture-establishment/perennial-pastures-western-australia
- Evergreen Perennial pasture information—http://evergreen.asn.au/
- Australian Wool Innovations—http://wool.com/
- Moora-Miling Pasture Improvement Group - http://www.mmpig.org.au/
- NyPa grass establishment video - https://youtu.be/kfqmZDGrylA

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Moore review
Landcare projects for Sustainable Agriculture 2007-2017
Moore Catchment Council