Australian Government

Future Drought Fund

FBG FITZGERALD BIOSPHERE GROUP

Increasing groundcover to build resilient soils in the Western Fitzgerald Biosphere

Project Funded by the Australian Federal Govt. by the Future Drought Fund: Natural Resource Management Drought Resilience Program Grants - Activity ID 4-G37IJ2N

Table of Contents

Introduction

Our project had two overarching objectives. One, to increase soil health across our landscapes by encouraging farmers to experiment with new and innovative ways of keeping continuous ground-cover on their paddocks. The second, to actively seek out and support key local farmers who are innovators and early adopters of transformative NRM practices. Our intention is to strive for a critical tipping point in acceptance, ownership and adoption of these practices in our area.

To increase the proportion of agricultural soils under permanent ground cover we provided incentives to experiment with practices not used in our area, including establishment of:

Perennial palatable native fodder species using the *Enrich model

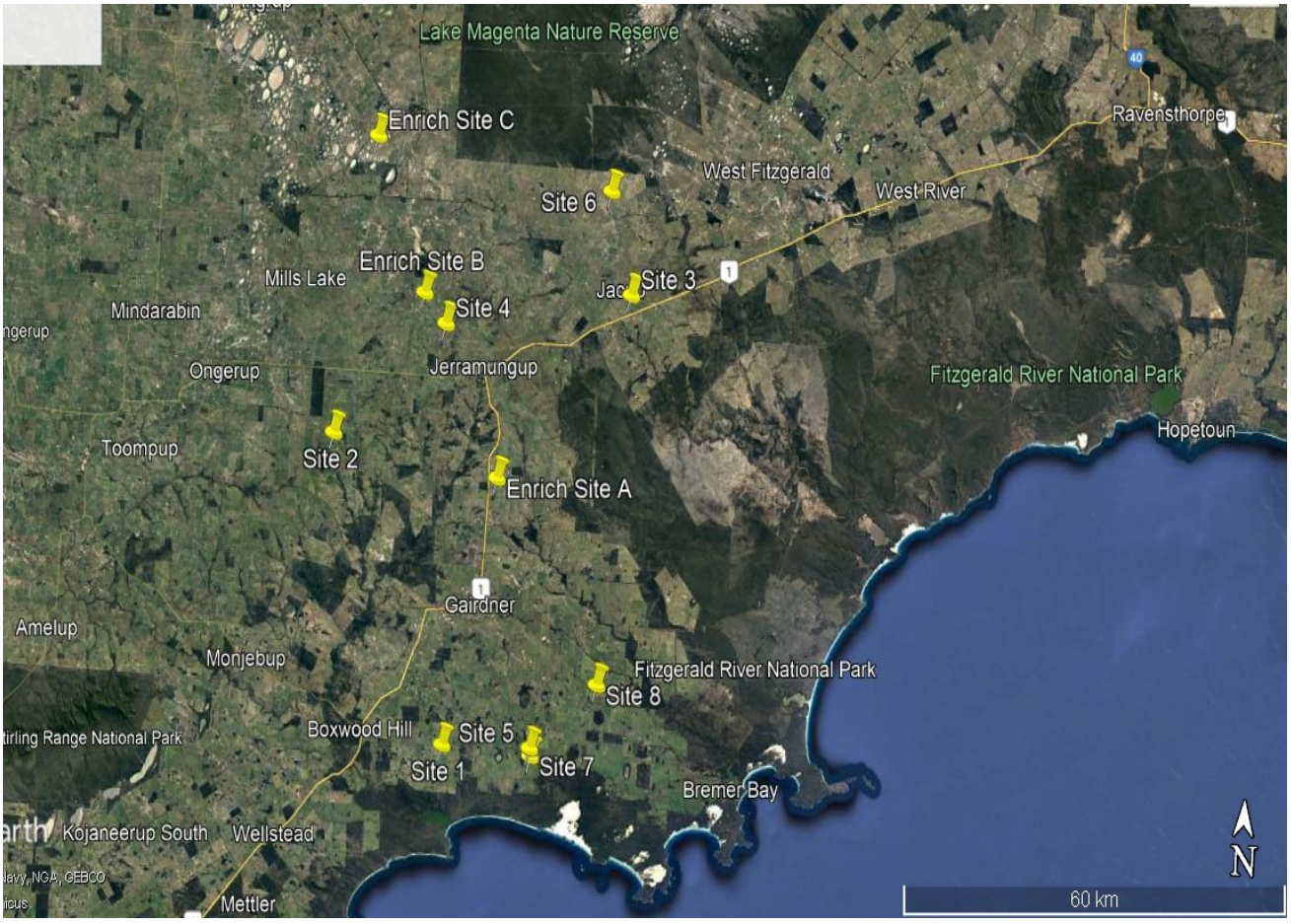
Multi-species forage pastures

Cool and warm season covers

Native grasses or other novel perennial fodder pastures

Protection and reclamation of marginal and salt affected soils by fencing and establishing permanent perennial fodder groundcover combinations.

*The CSIRO's Enrich Project assessed the edible biomass, nutritional value, health benefits and grazing preference for 94 Australian native shrub species. I*t demonstrated that farm profitability could be increased by up to 20% if between 5-20% of a farm were converted to a shrub-based system.*



Demonstration sites were spread across the Fitzgerald Biosphere Group region

Learnings from Summer Annual Multi-Species

The motivation for trialling multi species summer mix was to improve groundcover over summer and improve soil health whilst also providing stock feed in dry times (Summer and Autumn). There is many benefits of continuous ground cover. Green plants provide many hydrological benefits with reducing the risk of water erosion (storm water runoff), increasing water retention (through roots improving water infiltration) and reducing evapotranspiration by reducing the soil temperature (plant shading). The vigorous root growth of plants in warm temperatures can help break through hostile sub-soils improving overall soil structure and the plants increase carbon building through providing energy and protection for soil biology.

Summer crops have been planted in the area before but usually a mono-culture of a sorghum or millet. We wanted to assess the potential benefits of a diverse mix of species, many of these plants the farmers had not seen or heard about before.

The mix consisted of: millet, lab lab, cow pea, sorghum, forage corn, purple top turnip, buckwheat, sunflower, winter forage brassica and tillage radish.

Benefits to soil of turnip and radish tuber:

Improve compacted soil: once tubers breakdown they create channels, improving infiltration and surface drainage and in turn improve depth of root growth of subsequent crops and access to subsoil moisture (similar to deep ripping) resulting in greater resilience under drought conditions.

Improve nutrition in top soil: they are excellent N, P and K scavengers, accumulating nutrients in and around their tuber which then breaks down and is available in the root zone for subsequent crops

Ground cover! Reduce soil and erosion and run off: with adequate rainfall, they grow rapidly and provide canopy closure in 3 weeks, intercepting rain drops minimizing surface impact and protecting soil and biology from wind, extreme heat and evaporation.

Demo Site 1

Location: 7131 Bremer Rd, Bremer Bay
Farmer: Jarrod and Chelsea King
Soil Type: Grey Sand
Average Rainfall: 440ml
Date Sown: Oct 21, 2021
Sowing Rate: 31kg/ha
Fertiliser: Ktill 50kg
Summer Rain: Sown into moisture, no rain until March 2022, significantly lower that average summer rain, which reduced the production potential.
Observations: Excellent germination, then conditions became warm and dry, the grasshoppers attacked the broad leaves and the brassica and slowed growth. The plants held on well through a very dry summer. The radish and turnip managed to produce tubers that lambs grazed in March providing feed when very little else was available in the paddock. The summer mix provided wind protection and provided carbon through root and plant growth.

Nov 10, 2021

March 2, 2022

March 29, 2021 radish tuber and turnip tuber and root

March 29, 2022—purple top turnip, grazed by lambs

Demo Site 2

Location: Cardininup Rd, Needilup
Farmer: Jye and Kendall Duggan
Soil Type: grey loam
Average Rainfall: 380ml
Date Sown: Nov 9, 2021
Sowing Rate: 30kg/ha
Summer Rain: Sown into moisture, no rain until March 2022
Observations: Very similar experience at Needilup as Bremer Bay, with an excellent germination, then conditions became warm and dry, the grasshoppers attacked the broad leaves and the brassica and slowed growth. The plants held on well through a very dry summer. The radish and turnip managed to produce tubers that lambs grazed in March , and then good rains in March and April gave the pasture a second chance and 100% groundcover in May was achieved!! May is notorious for windy weather, this pasture guaranteed zero wind erosion and provided great feed in Autumn.

Dec 2, 2021

Dec 18, 2021

March 9, 2021 Sunflowers finishing

May 3, 2022 incredible new growth

Demo Site 3

Location: 2374 South Coast Hwy, Jacup
Farmer: Kal and Kirby Bailey
Soil Type: sandy loam over clay
Average Rainfall: 400ml
Date Sown: Nov 15, 2021
Sowing Rate: 30kg/ha
Fertiliser: Ktill 50kg/ha into variable moisture, no rain until March 2022
Observations: The paddock received 11ml prior to sowing and 2mm post sowing but it still struggled to germinate consistently. One learning for this site is that it was got too warm and soil started to dry out which affected germination and early growth, an earlier seeding would have been preferential. The germination failed in areas of paddock, we managed to get some later photos which show the potential of the plants if given adequate rain over summer. The corn (big seed size) seemed to survive the best which also suggests seeding depth might have been too deep for the smaller seed plant species. Late March rains enabled some areas to grow but not consistently across paddock.


23 March, 2022

2. New options for perennial pastures

Demonstration Site 4

There has been some plantings of perennial pastures in the region in the past but mostly mono culture pastures of lucerne. There has been low adoption of lucerne or other perennial pastures recently due to some varieties of lucerne not tolerating heavy grazing or producing enough feed through winter. But the new varieties of lucerne have much better grazing tolerance and all year round productivity. The motivation behind the 7 way multi specie perennial mix is to increase diversity, reduce risk and improve overall ground cover.

The perennial mix included: Megamax Panic, Setaria, Lucerne, Chicory, Plantain, Cocksfoot, Strawberry Clover

The diversity in this mix should provide high levels of groundcover year round and the legumes over time should provide nitrogen for the grass-

Location: Gnowangerup Jerramungup Rd, Jerramungup
Farmer: Nathan and Wendy Brown
Soil Type: sodic clay
Average Rainfall: 375mm
Date Sown: Sept 20, 2022
Sowing Rate: 10 kg/ha
Observations: Two wet winters has made sowing this site difficult, however it has just been seeded and hopefully conditions will be kind for a great establishment.

Demonstration Site 5

Ecotain Plantain - a perennial herb

Ecotain Plantain is a new plantain variety that has not been trialled in the area. It persists through hot summers and wet winters if it is not overgrazed in these conditions. Ecotain® has erect growth and broad leaves enabling maximum groundcover. Ecotain® has a coarse fibrous root system which is very efficient at extracting nutrients, meaning Ecotain® can perform in a wide range of soil fertility.

Ecotain® has the ability to recover quickly from long dry periods once it receives moisture, getting to a grazable mass very quickly. This autumn recovery can provide quick feed while grass paddocks regrow. The ability of Ecotain® to survive dry periods makes it a great 2-3 year option where a high quality forage is required from autumn to late spring/summer. In this demo site we have sown Ecotain by itself and also mixed with a summer multi-species. The summer mix includes Millet, Pillar Rape, Sunflower, Sorghum, Safflower, Mustard, Radish, Linseed and Purple Top Turnip

Location: Bremer Bay Rd, Bremer Bay
Farmer: Anthony Thomas
Soil Type: grey sand
Average Rainfall: 480mm
Date Sown: Sept 27, 2022
Sowing Rate: 10 kg/ha of straight Ecotain and then 5kg/ha Ecotain and 5kg/ha summer mix
Observations: The ecotain and summer mix both need a rising soil temperature so sowing has just occurred.

3. Saltland Fodder Sites

The motivation for this site was too improve groundcover year round and ultimately soil health and productivity. The soil is on the edge of salt land, at risk of becoming saline so a mix of salt bush (Anamaeka and Eyres Green) salt tolerant legume (messina) has been sown. The idea is for the saltbush will drawn down the water table and lower salt level and messina will nodulate and provide nitrogen to the Tall Wheat grass that has been sown in the area previously. The diversity of plants will provide a functioning ecosystem that should improve soil and productivity over time.

Demo Site 6

Location: Jacup North Rd, Jacup
Farmer: Brad and Jess Bailey
Soil Type: grey clay
Average Rainfall: 320mm
Date Sown: Sept 7, 2022
Observations: The saltbush and messina clover have just recently been seeded.

Sowing of messina and then planting of saltbush seedlings along rip lines.

Demonstration Site 7

This site was on a sandhill with native velt and patchy legume coverage. It is a high rainfall area with fragile sandy soils that are prone to rapid drying and wind erosion, with some wet areas between dunes.

Rows planted with Anameka and Eyres Green Saltbush plus Viminea Juncea (for sheep parasite control) plus seed of Messina and River saltbush (7m row spacing), plus creeping saltbush and Enchylaena Tomentosa.

This is a trial to assess the effectiveness of saltbush based systems (Enrich) on sandhill type country for additional production and soil protection.

Location: Bremer Bay Rd, Bremer Bay
Farmer: Anthony Thomas
Soil Type: grey loam over clay
Average Rainfall: 500 mm
Date Sown: Sept 20, 2022

4. Native Grass Trial - Kangaroo Grass

The motivation behind the Native Grass Trial site was to investigate the potential to utilise a native grass to improve ground cover, soil health and production in an area that is marginal for cropping and annual pasture production. Kangaroo grass is native to the area but has been largely wiped out by grazing and herbicides in cropping systems. If we can establish the Kangaroo grass we are hoping it will provide year round ground cover, a vast root system and quality livestock feed without the need for high fertiliser or other inputs. Seed is very hard to find and expensive so this trial will be monitored by the farmer closely.

Demonstration Site 8

Location: 3106 Swamp Rd, Gairdner
Farmer: Peter Smith
Soil Type: grey clay
Average Rainfall: 480mm
Date Sown: Sept 20, 2022
Sowing: All seed was dry smoked for 24hr then sowed at a depth of 1.5cm at 250g/ha and then some seed heads were hand placed on row and rolled in.

An example of Kangaroo Grass

Seed plus fertiliser and Spongelite to bulk up and

Enrich Style Demonstration Sites

The purpose of the CSIRO Enrich research project that ran from 2004 to 2013 was to investigate a way of producing year-round stock feed at minimal risk to a farming system using perennial plants already adapted to Australia's difficult and variable climate. About 96 native species were tested for nutritional value, palatability and other benefits. The shortlisted species were then used to develop a grazing system that integrates into existing farm operations. A high number of species selected are saltbush. The research showed that planting 10-15% of a property into a mixed perennial system with an annual pasture inter-row had multiple benefits. Two major benefits were: • A significant reduction in supplementary hand feeding during the feed gap. • A financial return from deferred grazing of annual pastures that are considerably more productive for the rest of the year. Plus the environmental benefits of increasing ground cover, protection from wind and water erosion and increasing water draw down on land at risk to salinity.

We wanted to use the research that had already been done to create 3 demonstration sites (approx. 10ha each) in our area to assess the effectiveness and suitability to our area.

Enrich Demonstration Site A

Location: 31541 South Coast Hwy, Gairdner
Farmer: Jeff and Tamara Pike
Soil Type: heavy grey clay
Average Rainfall: 375mm
Date Sown: Sept 7, 2022
Species Sown: Anameka, Eyres Green and River Saltbush sown in rows, and then seed of Messina clover, Enchylaena tomentosa and creeping salt bush in alternate rows.
Observations: This Enrich style demo site is positioned in an area of marginal land. It is an area that struggles to maintain groundcover throughout the year and not suitable for cropping. The Pikes are hoping the site will create it's own ecosystem and provide food and shelter for livestock in dry times.

Enrich Demonstration Site B

Location: 813 Needilup North Rd, Needilup
Farmer: Wade and Jess Brown
Soil Type: sandy loam over clay
Average Rainfall: 375mm
Date Sown: Sept 6, 2022
Sowing: This Enrich style demo site is positioned along a partially cleared drainage line that cuts through property. This site already contains many Enrich type fodder plants (blue bush, creeping saltbush, enchylaena and several acacia species. There is patchy coverage of velt grass and some clover, therefore it is important to establish salt bush at low density to ensure it doesn't out compete existing pasture. The motivation is to improve the existing pasture and groundcover by adding salt bush and other fodder shrubs (including viminea juncea for parasite control in sheep) in rows (10m spacing). This extra groundcover can help in times of drought for areas for sheep to graze.

Enrich Demonstration Site C

Location: 745 Cowcher Rd, Lake Cairlocup
Farmer: Trevor and Carol Daniel
Soil Type: deep sand
Average Rainfall: 300 mm
Date Sown: Sept 26, 2022 into good moisture
Observations: This Enrich style demo site is positioned in an area of paddock that has suffered from wind erosion in dry years, attempts to establish annual crop and pasture have not been successful. The motivation is to improve the existing pasture by adding salt bush and other fodder plants in rows. There is lucerne growing well nearby and it is hoping the salt bush, and the panic will tap into sub soil moisture like the lucerne does and stabilise the area. Once stabilised the salt bush, juncea vimenera and panic should provide groundcover and significantly improve the resilience and productivity of this area and prevent further wind damage.

Degraded areas of severe wind erosion from previous dry years