Revegetation That Works: Practical Design, Benefits and Case Studies

Mick Durant and Zoe Birnie - Greening Australia

Landscapes Board SA Carbon Farming Webinar Series – May 2026

Greening Australia

LANDSCAPE SOUTH AUSTRALIA

Restoration Decade Alliance
Australian restoration organisations supporting the
UN Decade on Ecosystem Restoration

Acknowledgement of Country

Overview

- Context setting:
  - Who is Greening Australia
  - The problems we are working to address
  - An impact-centric approach
- Ecological restoration – multiple benefits & designs
- 40+ years of experience – what works and what doesn't
- Practical examples and case studies

Context Setting

Credit: Paul Moses

Greening Australia

We believe that people thrive when nature thrives

Greening Australia

Registered not for profit with over 40 years' experience in rebuilding nature by connecting community, economy and environment. Collaborates with diverse partners, including business, community, First Nations Peoples and landholders, to deliver high impact, science-based, biodiverse restoration projects that help people and nature thrive.

NATIVE SEED BUSINESSES

Nindethana

National seed business that sources and processes Australia's largest range of high quality native seed to sell into the restoration market.

SeedX

Focuses on producing high quality, genetically diverse native seed for restoration, and supporting the overall growth of a healthy native seed sector in Australia. The first seed farm is in development.

canopy

Environmental markets business that specialises in producing and selling high integrity environmental credits. Advises businesses with net-zero and/or nature-positive goals on the development and feasibility of environmental credit projects.

Credit: Paul Moses

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Global Biodiversity & Climate crisis

- One million species threatened with extinction
- Climate change accelerating ecosystem collapse
- Food security and production
- Economic pressures
- Colonisation impacts on First Nations communities and cultures

We depend on natural resources and ecosystem services

Credit: Matt Beaver

The Need for Ecological Restoration

2022 Kunming-Montreal Global Biodiversity Framework

- 23 targets to conserve and restore ecosystems
- Restore 30% of all degraded ecosystems by 2030 (Target 2)
- Conserve 30% of land and water by 2030 (Target 3)

Australia's Strategy for Nature 2024-2030

- 6 priority targets
- Protect and conserve 30% of land and marine environments by 2030
- Priority degraded areas are under effective restoration by 2030

A compelling and urgent case for ecological restoration at scale

- Biodiversity
- Land repair / resilience
- Carbon sequestration
- Agricultural productivity
- First Nations partnerships

Climate and biodiversity crisis

Example: Western Eyre Peninsula

Agriculture and Land use:

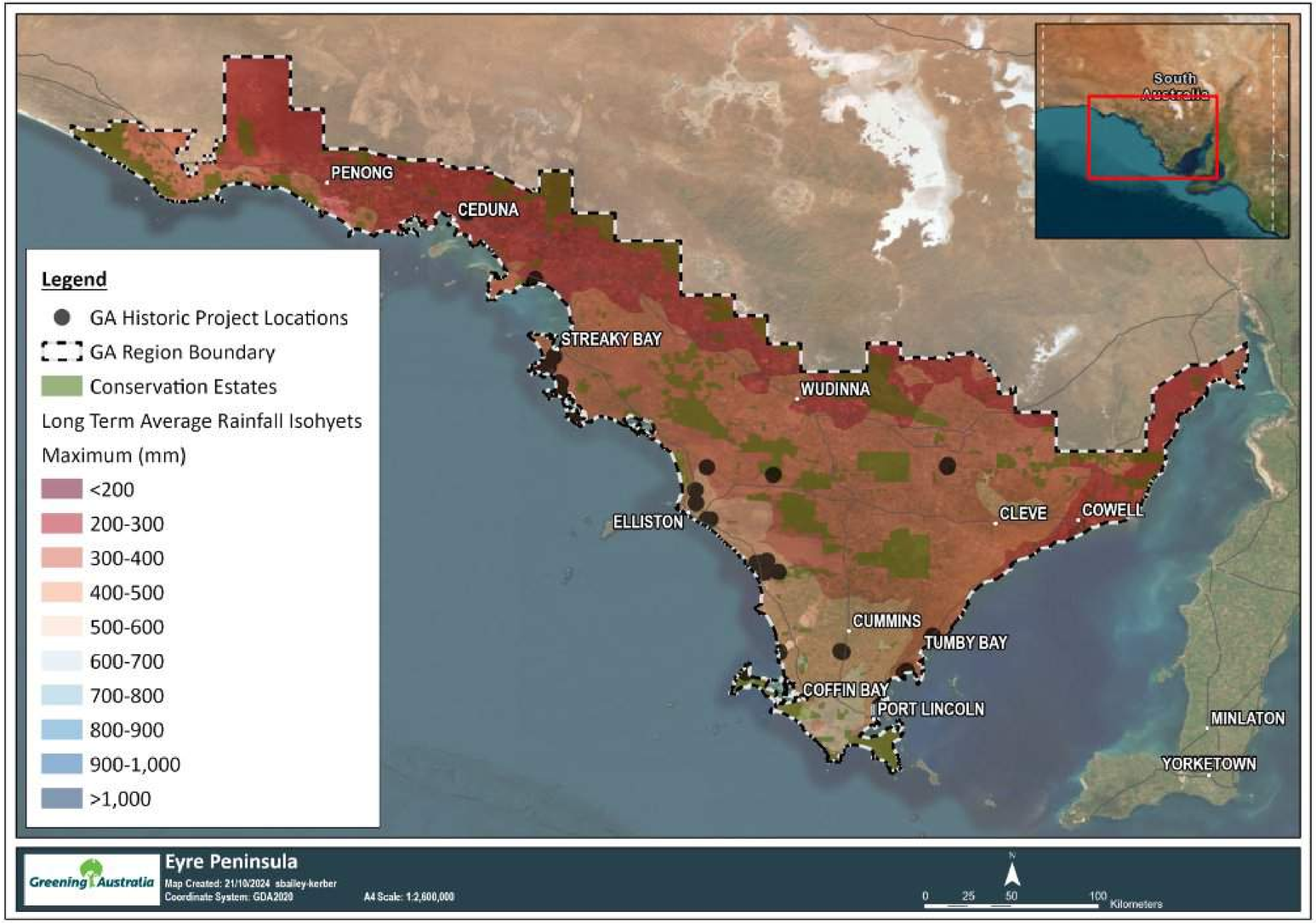
- Sheep and wheat belt. Western EP rocky soils primarily grazing

Priority Environmental Assets

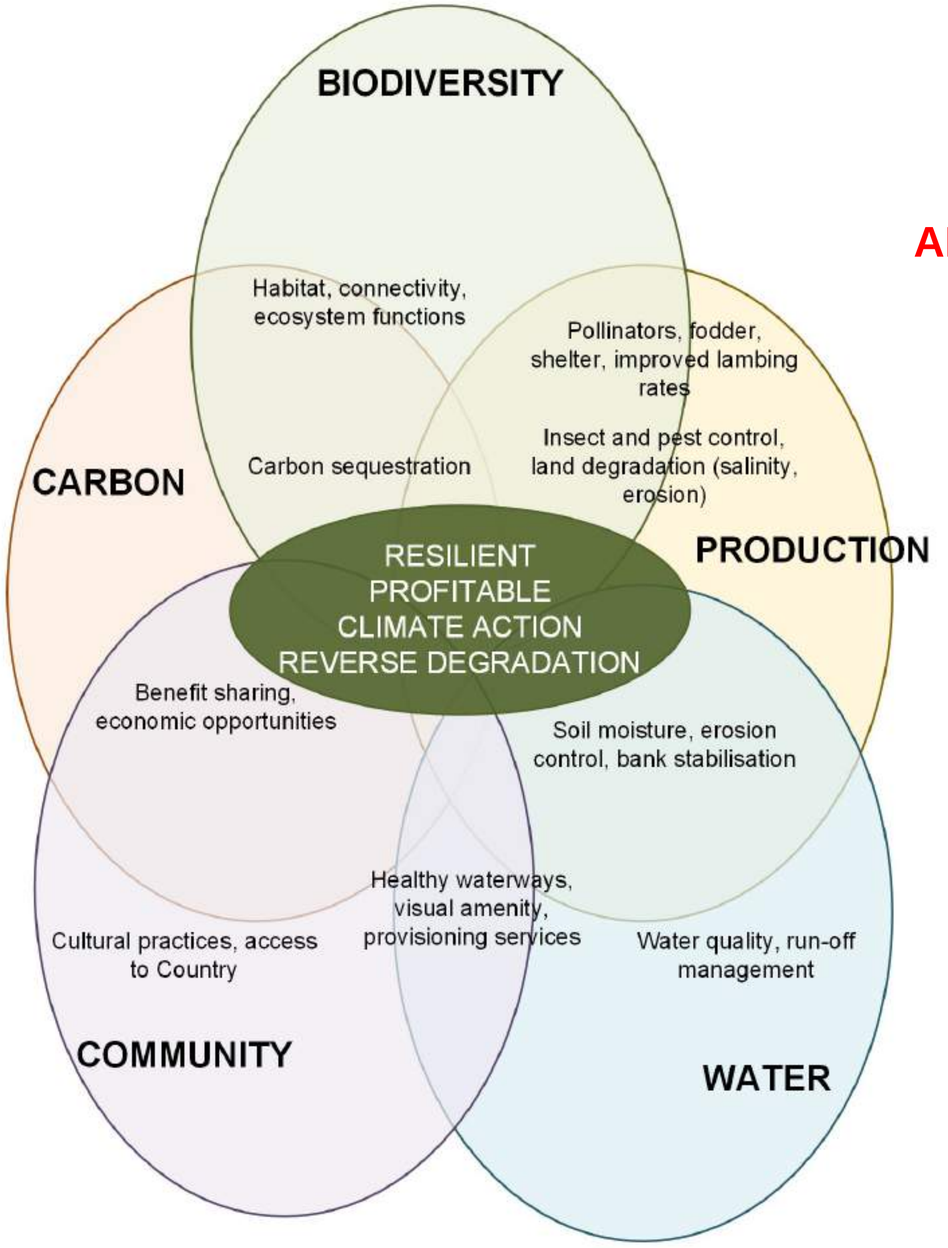
- Sheoak Grassy Woodland – critically endangered ecological community (less than 5% remaining)
- Threatened animal spp. (e.g. Malleefowl, small mammals and EP Southern Emu-Wren)
- Threatened plant spp. (high level of endemism)

Threats:

- Historic habitat loss and fragmentation
- Total grazing pressure (incl. native, feral & livestock)
- Soil loss and erosion
- Climate change – hotter and drier



The case for ecological restoration: Multiple benefits

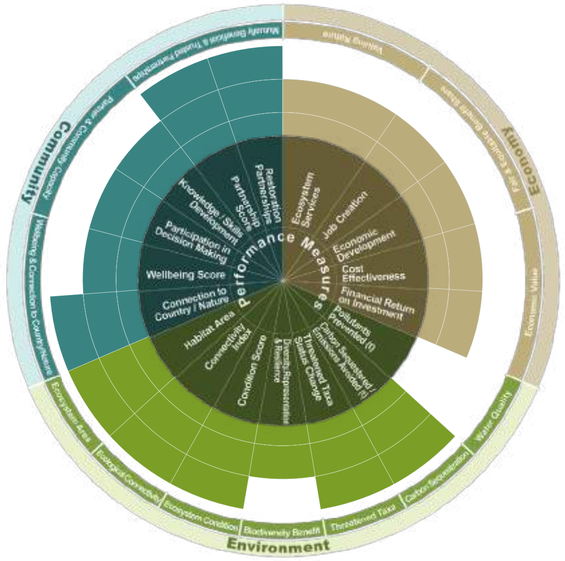


ALWAYS multiple benefits to native species revegetation

Planning and designing for Impact – project examples

Objectives for Environment, Community and Economy benefits

Habitat Restoration (biodiversity emphasis)



Connectivity
Threatened spp.
High floristic diversity
Partnership approach

Biodiverse Revegetation (carbon emphasis)

Carbon yield
Cost effectiveness
Moderate spp. diversity
Short-term partnerships

Shade Shelter Fodder (productivity emphasis)

Fodder/shelter for livestock
Land repair (saline, marginal areas)
Co-design with landholder
Integrated with ag enterprise

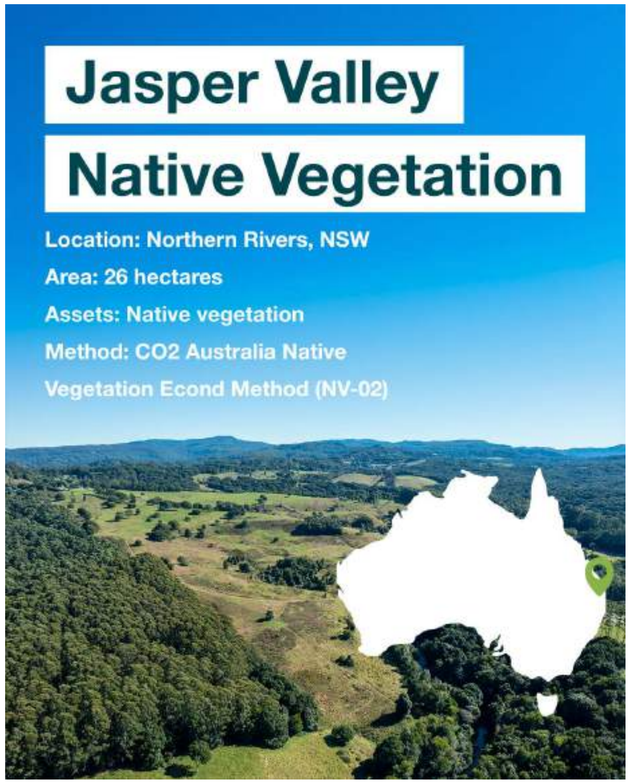
Queensland Indigenous Land Conservation Project

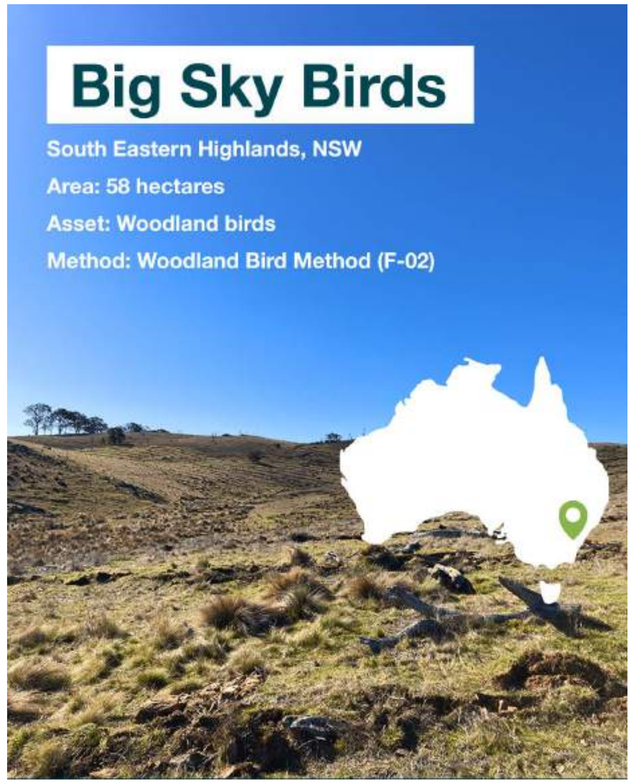
Community centric
Caring for Country
Training & employment
Economic development

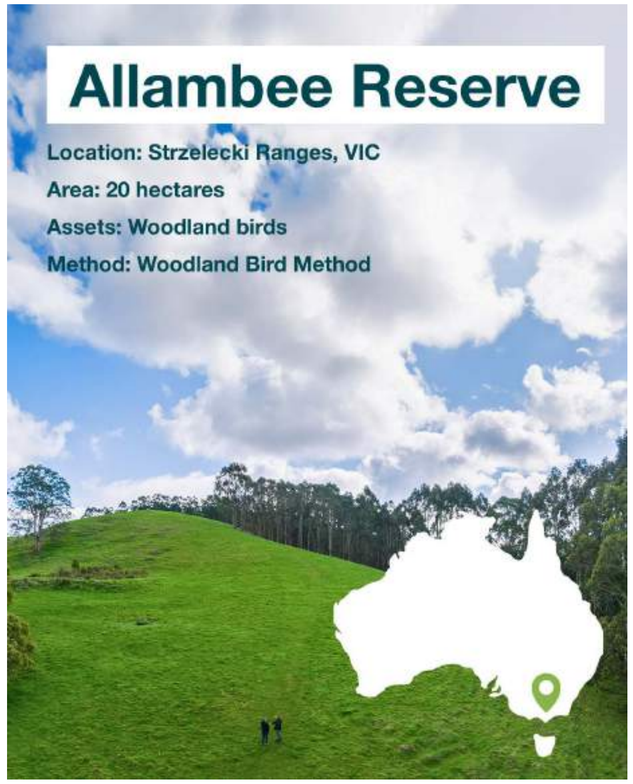
Measuring Impact

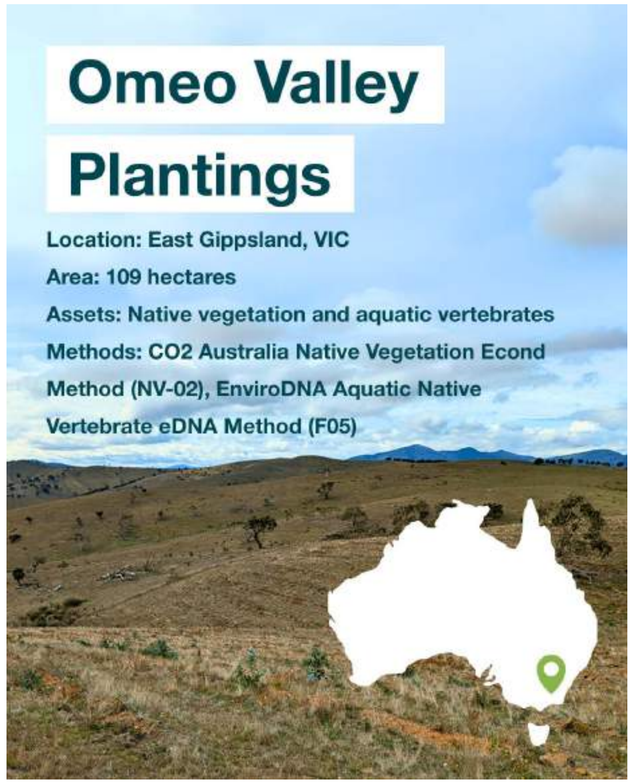
Assessing Nature Positive outcomes via Accounting for Nature

- Four registered projects across NSW and Victoria – Nestlé portfolio
- Currently developing Environmental Accounts to submit for certification
- Baseline monitoring of environmental condition vs reference ecosystem > track and report change
- Exploring the use of different methods (native vegetation, woodland birds, aquatic eDNA)









Generating multiple benefits in Agricultural Landscapes: Restoration Designs

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greeningaustralia.org.au

Shelterbelts

Design:

- Mixed native species planting to reduce/redirect wind
- Maximise height – determines the distance of protected area
- Maximise length – longer = more effective than short (10-12 times the height)
- Width – as wide as you can (40m to enhance biodiversity)
- Location – perpendicular to problem winds
- Initial grazing exclusion for vegetation establishment

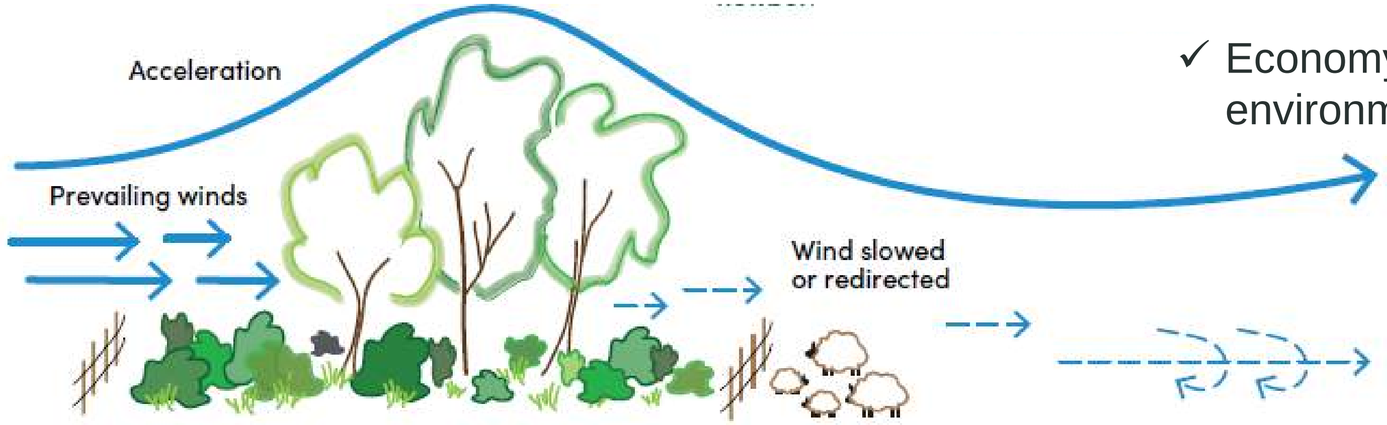
The benefits:

✓ Livestock productivity: reducing windspeed by 50% can increase liveweight gains in sheep by 40% and reduce lamb mortality by up to 50% (Sustainable Farms, 2022)

✓ Crop and pasture: productivity gains of ~8% and crop yield increases of 22-47% (wheat, oats, lupins) with planting 10% of cropping area (Sustainable Farms, 2022)

✓ Biodiversity: habitat for birds, invertebrates, pollination services

✓ Economy: eligible for carbon credit schemes; financial and environmental asset



Shelterbelt design. Sourced from Sustainable Farms (2022)

Credit: Julie Clark

Shelterbelt at planting, reconnecting habitat

Wadawurrung Country


Shelterbelt ~4 years old
Eastern Maar Country

Shelterbelt at planting, 7 rows trees and shrubs

Shade Shelter Fodder

Design:

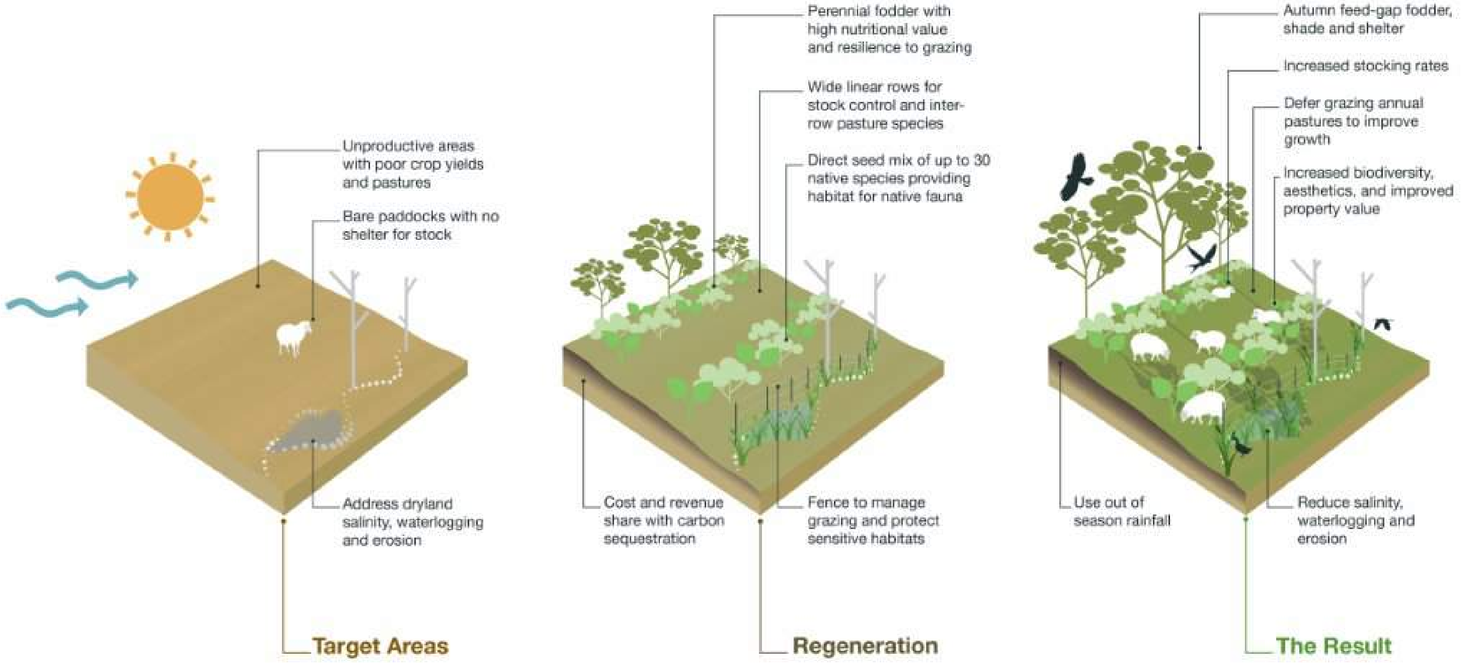
- Mixed native species regenerative planting
- Perennial forage value
- Increased tree cover on cleared or degraded farmland
- Paddock scale
- Initial grazing exclusion for vegetation establishment

The benefits:

✓ Productivity: provides grazing value, important during drought or feed gaps, addresses land degradation and soil erosion

✓ Biodiversity: increased native vegetation cover, pollination, habitat

✓ Economy: designed to be profitable for farmers



See GA website: https://www.greeningaustralia.org.au/projects/shade-shelter-fodder/


Goreng Country
Greening Australia

SSF ~ eight years old, grazed, moderate salinity

Ballardong Country

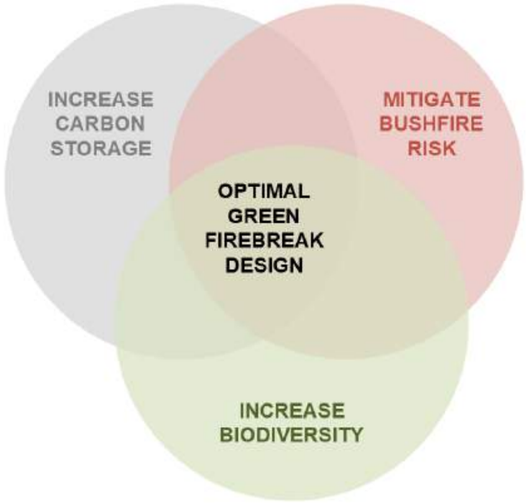
Project: Darren West, Jennacubbine

Greening Australia

Green Firebreaks: Fire-aware Revegetation

Research led by University of Melbourne and Greening Australia with support from the NAB Foundation.

Green Firebreaks are carefully designed plantings of low-flammability native vegetation, strategically placed to help reduce fire risk while generating benefits for biodiversity and carbon.



The benefits:

- ✓ Increase biodiversity: support habitat, increase plant species diversity
- ✓ Productivity: restore low productivity paddocks, shelter for livestock
- ✓ Sequester carbon: sequesters carbon from the atmosphere
- ✓ Mitigate bushfire risk: reduce windspeeds, increasing moisture and slowing fire rate of spread.

See GA website: https://www.greeningaustralia.org.au/how-green-firebreaks-can-build-landscape-resilience/

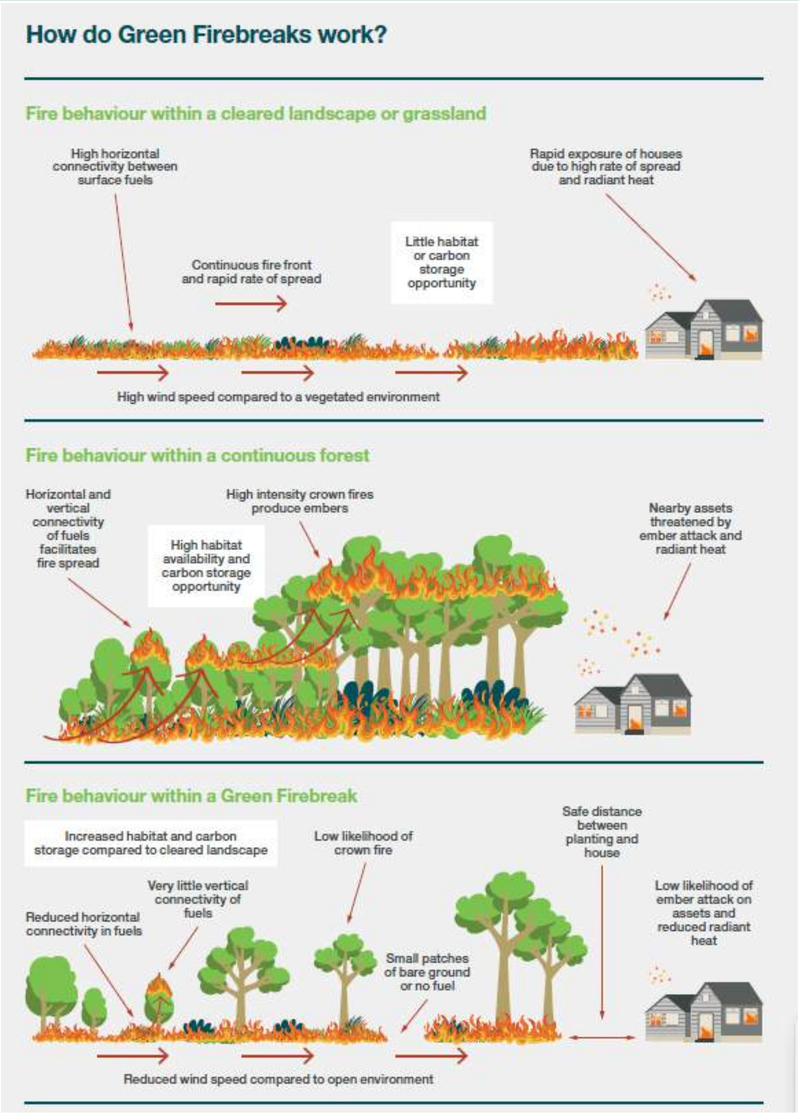
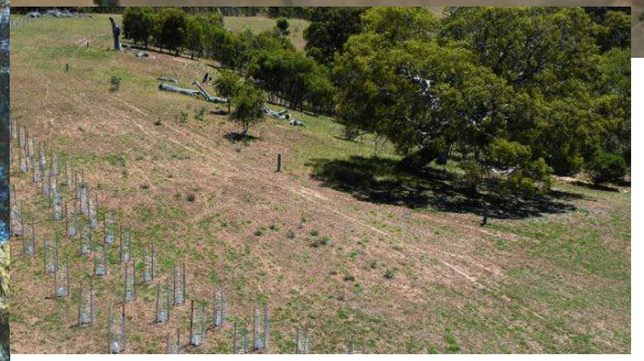


Diagram showing comparison of fire behaviour under different vegetation scenarios (Marshall et al. 2024)

Wadawurrung Country

Design considerations:

- ✓ Use scattered trees and shrubs to reduce wind speed
- ✓ Break up vertical and horizontal vegetation continuity
- ✓ Low-flammability native species
- ✓ Maintain low biomass and integrate native groundcover (improved native pasture benefit)
- ✓ Local conditions influence fire behaviour – slope, wind direction, surrounding remnant vegetation



Not a silver bullet – local context very important.

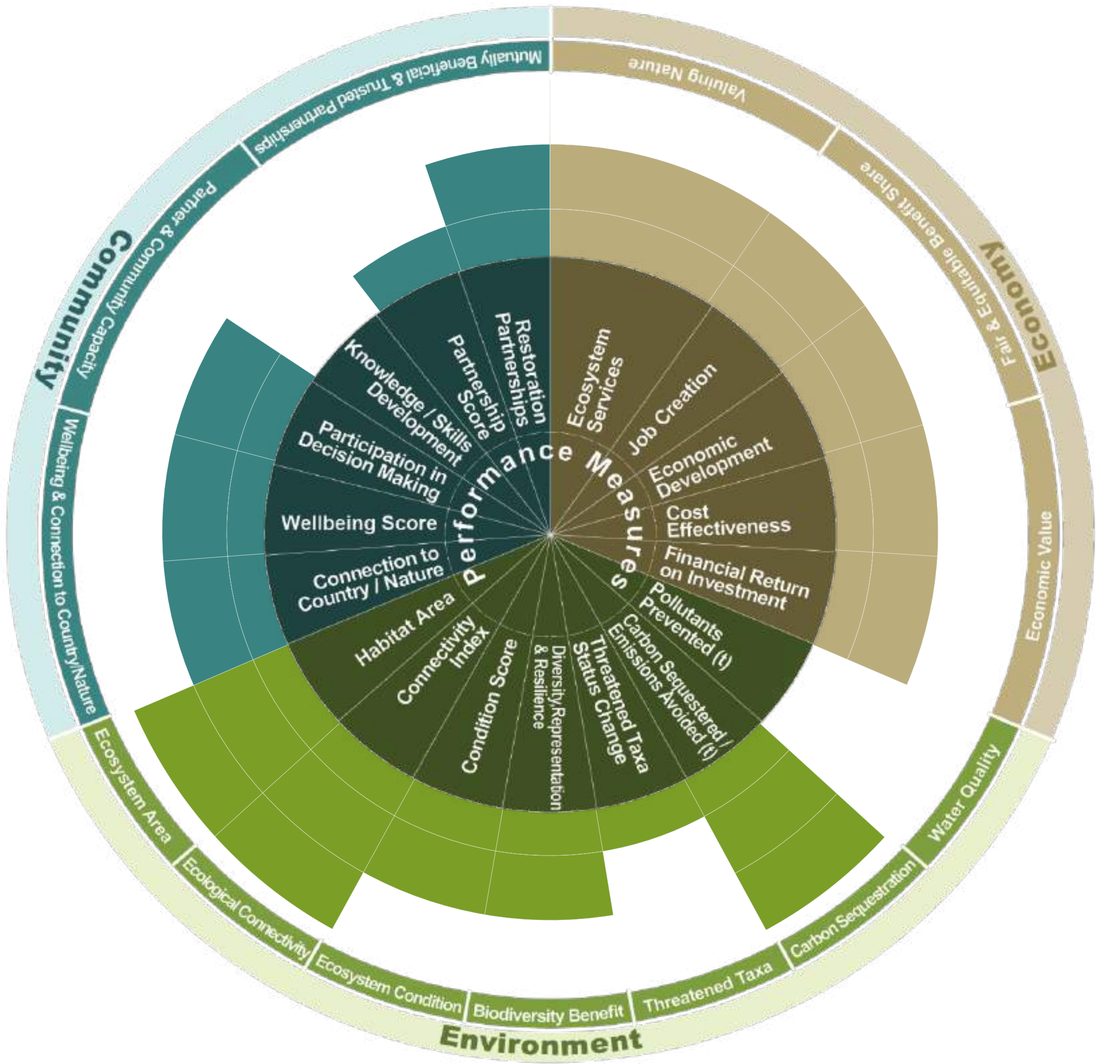
Habitat blocks

Design:

- Mixed native species regenerative plantings across a working farm
- Restore lower productivity areas
- Target biodiversity corridors (riparian areas, degraded gullies)
- Vegetation structure for habitat (thr spp, thr ecological communities)


Credit: WWF Australia Think Mammoth

Large-scale carbon planting



Credit: Mark Thomas

Carbon Environmental Planting:
biodiverse and ‘equity-centred’ > $60 ACCU

Whole Of Paddock Rehabilitation

Design:

- Widely spaced tree belts across the whole paddock
- More than 10 ha in size
- Spell the paddock during establishment
- Generally no fencing required

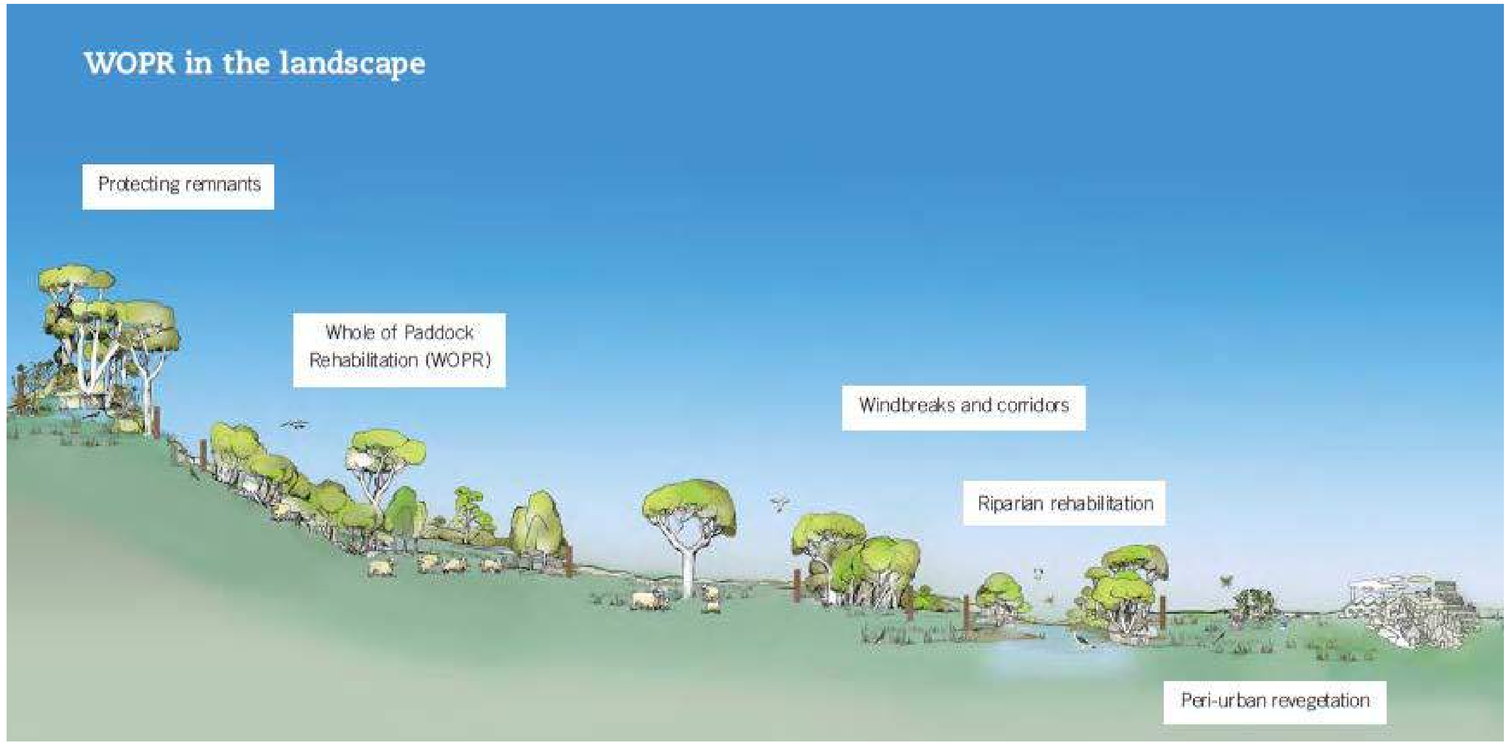
The benefits:

✓ Livestock – improved weight gain and reduced lamb mortality, feed gap, perennial pastures, improved soil functions

✓ Biodiversity – increased native habitat, especially for birds, connectivity

✓ Stewardship payment

✓ Can be part of an integrated landscape approach



See GA website: https://www.greeningaustralia.org.au/projects/wopr/

WOPR 2


September 2011


September 2019


Whole of Paddock Rehabilitation
February 2009
October 2017

WOPR


Whole of Paddock Rehabilitation
September 2014
Greening Australia
April 2020


2008


2021
Greening Australia

Restoration in Practice

PRACTICAL REVEGETATION TIPS: What works

What doesn’t work

- Unrealistic expectations (paddock environments, impatience)
- Wrong species/provenance for the land/soil type
- Difficult landscape/soil (e.g. salinity, floodplain/claypan, bleached deep sand)
- High browsing pressure (kangaroos, rabbits, sheep, snails, mice, RLEM)
- Competition from aggressive and/or prolific weeds (e.g. kikuyu, couch, veldt)
- Inappropriate herbicide use (residuals, poor timing)
- Poor timing of planting/seeding (e.g. season)
- Inappropriate tree density and vegetation structure (poor design or execution)

Revegetation Methods

- Mechanical Direct Seeding
  - Time-efficient for scale (tractor / 4WD / Polaris) ~20-30km per day
  - Often a cheaper option for vegetation establishment
  - Different machines for different conditions (rock seeder, offset discs, v-blade, multi-row)
  - Good site preparation and grazing exclusion (and herbivore control)
  - Can take time to see results (2-3 years)
  - Less control over result than with seedling planting
  - Restricted to a small range of species that perform in the paddock
  - Commonly rows 4m – 5m apart (2.5km – 2km per hectare) – squiggly or straight
- Seed
  - Seed availability or collection (can do yourself with permit)
  - GA owns Nindthana which sources from local collectors and does the QA
  - Rates: 600g-1.2kg seed per ha, or 300g – 500g per km
  - Seed treatments required (hot water, scarification, cold stratification)
  - Appropriate storage to ensure seed viability (shelf-life)


RODDEN
UKH 453
RODDEN
W T
woods forests


TOYOTA


Greening Australia

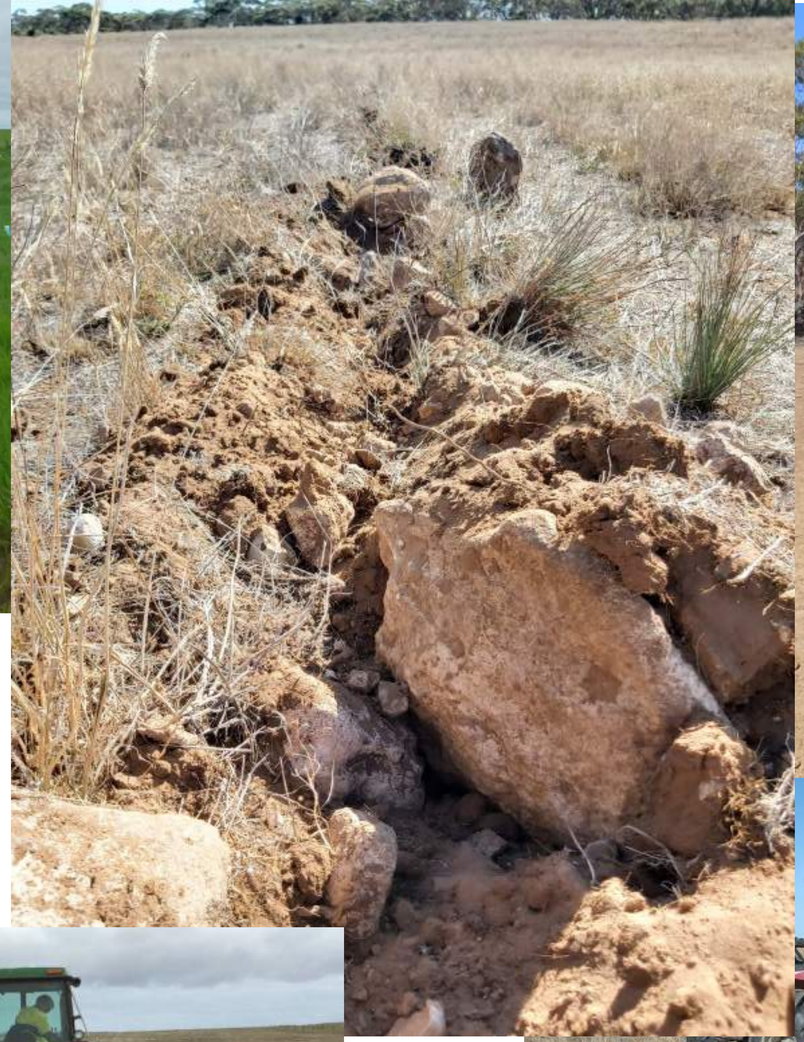
Establishment Methods

- Tubestock/Seedling Planting
  - High labour input (can do mechanical tree planters)
  - Might be used on slopes where direct seeding not possible
  - More certainty of species placement (e.g. control overstorey tree density)
  - Can propagate a wider range of species (cuttings, division)
  - Advanced growth stage (root mass vs top growth)
  - Can be susceptible to dry summers
  - Bulky to transport and may have pots and trays to recycle/dispose of
  - May need tree guards depending on browse pressure

- Other
  - Hand-seeding (e.g. rake-hoe, hand casting)
  - Brush methods (cut branches, thatching with native grasses)
  - Natural regeneration (assess what is growing in paddock, clearing history etc))

Site Preparation

- Strip-spraying
  - Herbicide knockdown for control during germination – usually for direct seeding
  - Leaves stable vegetation in between rows
- Broad-acre spraying
  - Often less desirable due to colonising weeds in the absence of grazing or cropping
- Spot spraying for tubestock (halo spraying)
  - Usually a 1m diameter circle for each seedling
- Ripping
  - Single-tyne to facilitate moisture penetration and root growth
  - Usually heavy or compacted soils but usually no-regrets
- Scalping
  - Take off topsoil which contains weed seeds (e.g. broad area with front end loader or grader)
  - Often used for grassland establishment
- Mounding, burning, ploughing and other techniques



Maintenance

- Grazing exclusion
  - Sheep and seedlings do not mix !
  - Rabbits – follow-up: very few can do a lot of damage until trees are above browse height (hares too)
  - Kangaroos – if high numbers then early phase control or protection is important – less so with maturity
- Weeds
  - Takes 7-10 years for trees and shrubs to out-compete standard paddock weed situations
  - Birds will bring in Boxthorn and other weeds
  - Top-spray can be used over direct seeding if extreme weed loads in spring or winter
- Tree guards (if using)
  - Can be effective grazing and wind protection: but avoid coreflute
  - Check for spinning or top-closing
  - Adds cost and effort to projects

Maintenance…..contd

- Watering
  - Generally not included at large scale (usually tubestock only) – but good timing is key
  - Smaller projects can include 2-3 waters over summer – do it if feasible – effective watering

Funding Your Revegetation

Sources of funding have been changing

- Traditionally mostly achieved by self-funding or government grants/incentive programs (Landcare ethic)
- Still some grant opportunities (e.g. Landscape Boards, NVC, Drought, NGO's) but declining
- Emergence of Corporate Social Responsibility (CSR) – private investment into outcomes
- Emergence of environmental markets (carbon production and offsetting, vegetation clearance offsets, Nature Repair Market)
- Increasing pressure on supply chains to account for greenhouse gas emissions and embedded carbon in supply chains
- Gap between the decline of Landcare type funding and the emergence of new markets
    - Was an observable lull in revegetation
    - Seed became less available
    - Lost some capacity in regions (technical advice and contractors)

Resources – where to find more information or assistance

- Landscape Boards
  - Grant funding programs
  - Enviro and ag projects
  - Feral animal control support
- NGOs
  - project funding (various sources & philanthropy etc)
  - Advice and assistance
- Publications
  - Large back-catalogue in SA but not always easy to find

Case Studies

Case Studies: SA private lands

Murray Mallee, Billiatt

- Landholder Aims: Regenerate land for wildlife
- Funding: Biodiversity Fund Grant (Commonwealth)
- Outcomes: Declining mallee bird habitat – e.g. Spinifex habitat for Mallee Emu Wren
- Other outcomes: Broombush trial (*Melaleuca uncinata*) tubestock

Case Studies: SA private lands

Sceale Bay, Eyre Peninsula

- Landholder Aims: Restoring ecosystems for biodiversity
- Funding: Carbon market
- Outcomes: Carbon and biodiversity plantings 100ha approx. Extend native vegetation area
- Other features: Mixed saltbush on a low-lying saline patch
- Other features: Low saltbush seeding in firebreak

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Case Studies: SA private lands

Fleurieu Peninsula

- Landholder Aims: Get trees back on hills while continuing grazing. Tourism B&B
- Funding: Carbon market & NGO projects
- Outcomes: Potential mainland habitat for KI Glossy Black Cockatoo
- Notes: Mostly burnt in the 2025 Talisker/Deep Creek Fire - recovery

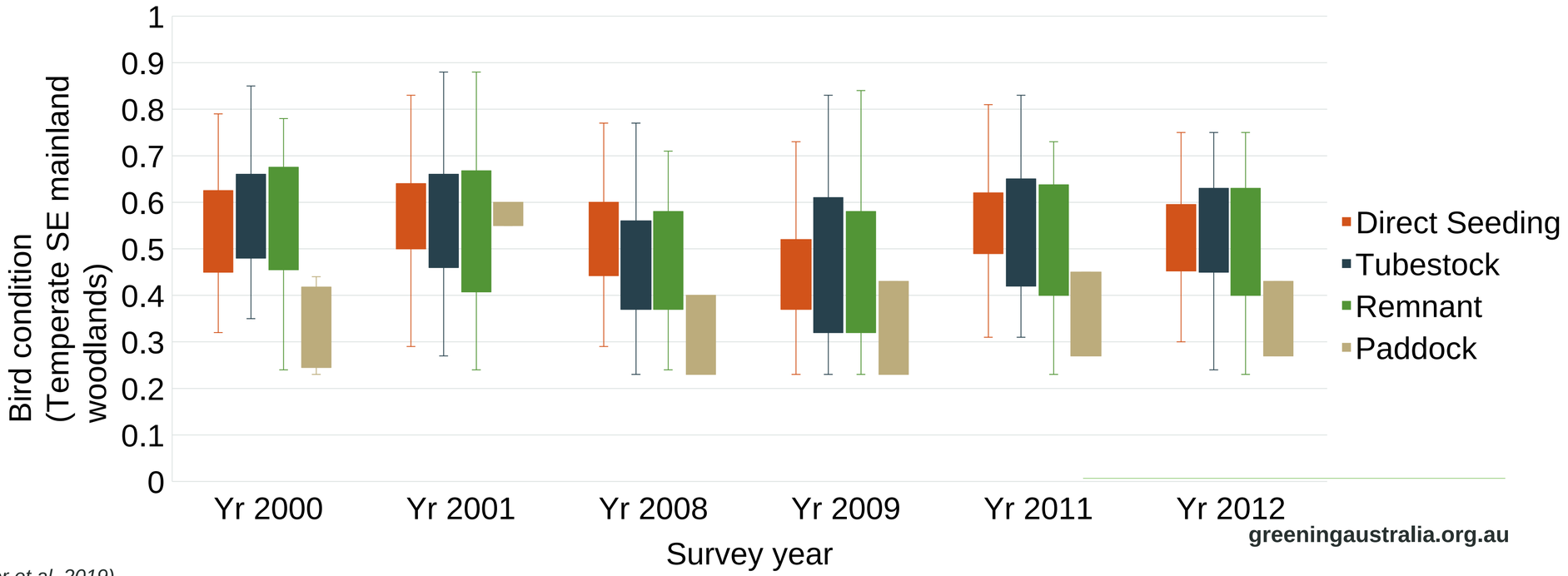
Case study: Avifauna evaluation – NSW / ACT

Valuing Revegetation for Woodland-Dependent Birds in Agricultural Landscapes

- 142 sites planted 1987-1999, 1500 bird surveys from 2000-2024
- Calculated bird site condition* in different ‘treatments’

- <u>Change over time</u>: initial +ve step change (0-5 yr), longer term less clear (~10-25 yr)

- Explaining variation requires detailed site and ecological understanding
- Implications for environmental markets – how to set targets for bird condition?
- We need sustained funding, action and partnerships to further enhance impact and improve our understanding



*Temperate SE Mainland Woodlands Bird Community (Fraser et al. 2019)

Outcomes for woodland birds from revegetation

Travelling Stock Reserve – NSW Southern Tablelands

Private land – NSW South West Slopes

Degraded box-gum woodland remnant

Direct seeding understorey 2000

2001

Australian Magpie
Common Starling
Eastern Rosella
Galah
Noisy Miner
Spotted Pardalote
Striated Pardalote
Superb Parrot

2008

Australian Magpie
Black-faced Cuckoo-shrike
Buff-rumped Thornbill
Common Bronzewing
Crested Pigeon
Eastern Rosella
Galah
Golden Whistler
Grey Butcherbird
Grey Fantail
Grey Shrike-thrush
Noisy Friarbird
Noisy Miner
Pied Currawong
Red Wattlebird
Striated Pardalote
Superb Parrot
Weebill
White-winged Chough
Willie Wagtail
Yellow Thornbill
Yellow-faced Honeyeater
Yellow-rumped Thornbill

2023

Australian Magpie
Black-faced Cuckoo-shrike
Buff-rumped Thornbill
Crimson Rosella
Double-barred Finch
Eastern Rosella
Grey Fantail
Grey Shrike-thrush
Laughing Kookaburra
Leaden Flycatcher
Noisy Friarbird
Olive-backed Oriole
Pied Currawong
Red-browed Finch
Rufous Whistler
Silvereye
Spotted Pardalote
Striated Pardalote
Striated Thornbill
Sulphur-crested Cockatoo
Superb-Fairy-wren
Superb Parrot
Weebill
Western Gerygone
White-plumed Honeyeater
White-browed Scrubwren
White-winged Chough
Yellow Thornbill
Yellow-faced Honeyeater
Yellow-rumped Thornbill

Summary

- Restoration within agricultural landscapes can look different (many options!) depending on the shared objectives and what you want to achieve (productivity, biodiversity, thr species target, visual amenity).

- Restoration can and should be designed with multiple benefits in mind across environmental, social and economic pillars.

- Observing outcomes and impact of restoration can take years. Long term monitoring to evaluate outcomes and sustained impact are crucial.

Questions / Discussion

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Australian restoration organisations supporting the
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