

Introducing...

Whole of Paddock Rehabilitation

A new approach to regreening the farm



Greening Australia's **Whole of Paddock Rehabilitation** (WOPR) offers an innovative approach to combating growing land degradation problems, restoring paddock health and providing multiple farm production benefits. Incentives for large-scale native plant revegetation, coupled with a fixed-term stewardship payment, will assist land managers to better address climate change, biodiversity losses, paddock tree decline, salinity and other land degradation issues at the paddock level. WOPR integrates conservation and production in a practical, cost-effective and user-friendly program.

Key features of WOPR

- 5–10 year management agreements to utilise entire paddocks for tree and shrub establishment on areas/paddocks exceeding 10ha
- Incentives to establish widely-spaced direct seeding belts and patches
- A 5 year revegetation period accompanied by a stewardship payment toward production loss
- Rotational grazing for the remaining 5 yrs



Whole of paddock rehabilitation; 12 years old



What will WOPR involve?

Step 1

Talk to Greening Australia (GA) about your eligibility and if appropriate organise a site visit with one of GA's WOPR field staff to discuss a management agreement for incentives and stewardship support.

Step 2

Identify a suitable paddock of at least 10 hectares (preferably 20–40 ha). Alternatively, a larger existing paddock can be subdivided according to land class to create an appropriate WOPR paddock.

Step 3

Prepare the site according to advice provided and the agreed design. GA will organise for the appropriate species of native trees and shrubs to be direct seeded in widely-spaced alleys along the paddock contours (eg 3–6 direct seeded treelines x 30–50m gaps). Alternatively clusters or clumps of direct seeding can be used for rocky sites or to avoid wind funneling. The project will provide the full cost of seed and seeding.

Step 4

Rest the paddock from grazing for a five year period. A stewardship payment of \$50/hectare/year will be offered following seeding, with 50% paid in years 1 & 5 respectively.

Step 5

After five years, the trees should be large enough to cope with grazing animals which can then be re-introduced under a rotational grazing system.



Merino sheep grazing amongst tree lines

Who is eligible for WOPR?



WOPR is designed to integrate large scale revegetation into a commercial grazing or mixed grazing enterprises. The program aims to attract participation from **primary producers (graziers)** who derive the majority of their income from the farm.

Participants taking part in the WOPR program will be required to agree to the following:

- Fill out and submit a WOPR application
- Sign a 5–10 year management agreement
- Commit to the agreement on the understanding that there is no intention to sell the property for the duration of the agreement
- Utilise direct seeding for revegetation wherever possible
- Agree to a strict 5 year grazing exclusion
- Undertake site preparation, fencing and pest management as required
- Host field days or Open Farm days as identified
- Undertake some simple photo monitoring and recording at the site
- Allow for detailed monitoring and evaluation by GA staff and volunteers
- Notify staff of any changes or concerns at the site
- Participate in surveys as required

WOPR agreements represent a partnership toward environmental restoration and are designed to achieve mutually beneficial outcomes for both production and conservation.



What are some of the benefits of WOPR?

WOPR is designed to deliver both production and conservation benefits including:

Livestock Production

- Improved weight gain and performance from increased shade and shelter
- Reduce mortality of lambs and off-shears sheep
- An additional feed source for livestock during summer through the ingestion of acacia pods and foliage (see *page 9*)
- Potential for increased resistance to internal parasites (worms) through the consumption of acacia pods
- The return of pasture to heavily eroded or saline areas
- Improved soil stability and soil health through nitrogen fixing and nutrient cycling

Nature Conservation

- Little to no fencing and cost effective revegetation
- Regeneration of remnant vegetation and paddock trees
- Increased native habitat and biodiversity, especially for birds
- Sizable "stepping stones" to connect patches of remnant vegetation
- Future seed sources for further revegetation
- Increased carbon sequestration to alleviate impacts of global warming
- Reduced spread of wind-borne weed seeds
- Less salt and sediment entering creeks and rivers



Direct seeding has revived dying paddock trees

WOPR – Will's Paddock

A hypothetical case study

William Seed has a 1200ha grazing enterprise in the Crookwell district. During a site visit in early 2008 by WOPR field staff, he identifies 30ha of a 60ha paddock as a suitable site for direct seeding. The area consists of predominantly native pasture with some erosion and salt problems.

His 5 year management agreement, incentives and stewardship payment will include:

Project Contributions

- | | |
|--|---------------|
| • 700m of sub-divisional conventional fencing @ \$3,000/km = | \$2,100 |
| • Direct seeding early spring – 30kms seeding @ \$200/km = | \$6,000 |
| • Stewardship payments of \$50/ha/year = \$50 x 30ha x 5 years = | \$7,500 total |

Total package = \$15,600 or \$520/ha

Stewardship payment of 50% of total (\$3,750) paid in years 1 & 5

William's Contributions (estimations only)

- | | |
|--|---------|
| • Site preparation for seeding. Weed and pest animal control.
Est value of labour and materials | \$500 |
| • Additional fencing materials and labour. Est value of time and labour | \$2,000 |
| • % Loss of grazing production 1.2 dse (of ~2.2) \$60/ha/yr = | \$9,000 |
| • Standard Regulatory responsibilities | |

Estimated value = \$11,500 or \$383/ha

2008 Timetable

- June – Paddock identified and agreements signed
- July – Paddock heavily grazed, de-stocked and fenced
- Aug – 1m seeding strips sprayed with glyphosate to reduce competition for seeding
- Sept – Site direct seeded with 30 kms of treelines
- Oct – First stewardship payment received following seeding

2008–2013 Timetable

- Paddock is spelled from grazing
- Trees and shrubs germinate and grow
- Slashing or hay cut between alleys to reduce fire risk and weed burden
- Final stewardship payment received in Oct 2012
- Management Agreement expires and project is finalised

On going

- Livestock re-introduced under rotational grazing system
- Site is available for monitoring and evaluation under the program
- Site is available for field days, tours and site visits

Which paddock to rehabilitate ?



WOPR is best suited to the rehabilitation of "tired" paddocks. It may be lightly hilly country, often with few remaining trees, sparse ground cover and degradation issues such as waterlogging, salinity or erosion. WOPR paddocks may be chosen on recharge sites to alleviate salinity problems lower in the landscape. Weed infested paddocks will be assessed and considered for likely germination and direct seeding success on a paddock-by-paddock basis.

The stewardship payment is designed to contribute toward the loss of production, but is unlikely to fully offset the loss of grazing production on many sites. Approximately 1 dse or \$50/ha/year is provided.

The hilltop in these photos are an ideal location for Whole of Paddock Rehabilitation, providing much needed shade, shelter, fodder and salinity abatement. The remaining paddock trees will also benefit from a rest (grazing spell) and friends (additional trees and shrubs).



How is WOPR different to other incentive funding programs?

There are currently a number of incentive projects aimed at addressing issues of salinity, water quality and biodiversity. Traditionally these projects offer fencing and revegetation incentives for repairing riparian waterways, remnant vegetation and perennial pastures. WOPR's unique features include:

- Whole or sub divided paddock of 10+ ha to minimise fencing
- Fixed term stewardship payments for revegetation
- Incentives for large scale paddock restoration involving direct seeded trees and shrubs

How and what is established in the paddock?

Direct seeding is the proven revegetation method used for Whole of Paddock Rehabilitation. It is highly cost effective and can be done for a fraction of the cost of tubestock planting. Direct seeding is particularly suitable for larger areas, as it uses significantly less labour and resources. The mechanical seeding of a 20 ha paddock including seed preparation and mixing would take less than a day. WOPR paddocks are likely to be in light country on hilltops or break of slopes areas which are particularly favourable for direct seeding. There is also an added resilience during drought as seeds will only germinate under suitable conditions and the new native plants develop extensive root systems.

Why Seed?

A 20 ha paddock seeded at a density of 1 km per ha can yield around 2–3 stems per metre (Wilson, S 1998). At \$200/km this is at cost of \$4,000 for 50,000 stems or 0.08c per tree. If subsequent drought, rabbits or grazing removed more than three quarters (75%) of the direct seeding, the paddock would still contain 12,500 stems or 625 per hectare.

The same paddock planted with tubestock at a rate of 300 per hectare would take 3 weeks to plant. At \$1:50 per plant for materials only, this would cost \$9,000 for 6,000 plants. Even if none of the plants died, there would still be half the number than in the direct seeded paddock.

What will it look like?

Initially, up to 30% of the paddock will be vegetated in widely-spaced alleys or clumps. Over time, as many of the shorter-lived shrubs and trees die out, this figure will reduce. A standard direct seeding mix has around 10% of the long living eucalypts. If the site was continually grazed over a long time periods and these eucalypts were the only survivors, the site would likely return to a more open woodland systems of ~60 trees per hectare. The shrub layer can be maintained and encouraged using natural regeneration by incorporating a second grazing spell or cool burn. This would be best undertaken during a favourable growing season and before the shrub layer senesces (eg. between 10–15 years after seeding).



Widely spaced direct seeding around a rocky outcrop

Aerial view of whole of paddock rehabilitation



3 years after seeding



12 years after seeding

Image from google earth

A range of up to 20 tree and shrub species native to the local area will be seeded. This usually consists of Eucalypts, Casuarinas, paper-barks, bottle-brushes and wattles. Wattles and pea-species are used to help repair the soil as they fix nitrogen. The direct seeding design will take into account paddock shape, slope, topography, landmarks, access and management. Alleys and clumps of seeding will be designed to maximise wind and soil protection, erosion control and ease of management. Alleys will generally consist of 3–5 tree lines with a variable spacing of between 30–50m apart. Clumps of up to 1 ha can be used in rocky areas and to avoid wind funnels along contours. The distance between alleys or clumps can be manipulated to suit farm machinery and stock management, while maximising shade, shelter and landscape function.

Why wait?

Mounting evidence shows that climate change will result in more erratic and extreme weather conditions across the globe, continent, region, farm and paddock. Extreme weather conditions will be hardest felt in already vulnerable and exposed landscapes such as the heavily cleared, dryland grazing areas of SE NSW. Wind and rain storms, droughts and extreme temperature will impact soil stability leading to increased sedimentation and erosion, increased livestock stresses, diseases and mortality, weed invasion, loss of native habitat and species decline.

Some farmers in southern NSW have already responded to serious land degradation problems with big revegetation solutions. Among the most progressive and innovative is the Whole of Paddock Rehabilitation approach described in this brochure. Greening Australia is actively seeking partnerships and funding to support landmanagers in rehabilitating whole paddocks and will continue to research, monitor and evaluate these sites to better understand the full costs and benefits of combining production and conservation using the WOPR method.

Wattle it be?

Based on research and ANU thesis submitted by Graham Fifield, 2006

Land managers who have undertaken extensive tree and shrub revegetation have observed that the fallen seed pods from wattle trees are quickly eaten by sheep. These pods are moderately high in protein (10–20%), especially when compared to mature summer grasses. After flowering in spring, seed pods grow rapidly and are then shed from the tree during summer. These seed pods are a free and renewable resource that can supplement livestock feed as they fall at a time which often coincides with poor pasture quality. Anecdotal evidence from land managers also suggests that sheep foraging on wattle pods are fatter and healthier.



Wattle trees can produce large quantities of seed pods



In 2006, Greening Australia supported an honours student from the Australian National University to investigate aspects of stock performance with access to acacia browse. Observations conducted under a range of conditions suggest that the pods and foliage (browse) from local wattle trees are palatable and non-toxic. The exciting and unexpected finding of this work was that sheep grazing amongst wattle trees were less affected by internal parasites (worms) than their counterparts grazing in pasture. The tannins contained in wattles are thought to be lethal for intestinal worms and their larvae, and this research suggests that the mob of sheep with access to wattle trees consumed enough pods and tannins during the trial to reduce their worm burden. Research into the use of wattles in this way has been undertaken for resource-poor farmers in Africa. In one such laboratory trial involving tannin-rich drenches (Max *et al* 2003), Faecal Egg Count (FEC) was reduced by 75% and worm burden by 86% in sheep infected with Barber Pole worm (*H. contortus*). These results highlight the potential benefits of revegetation for sheep health. Greening Australia is looking to conduct further research into the role of acacias in reducing worm burden in sheep.



Wattle pods can provide an additional source of feed during dry times

Salt Licked – A Paddock in Binalong

Based on a report by Louise Hufton, Binalong Landcare Group, 2002



The **Salt Licked** paddock in Binalong is like many across the Southern Tablelands. It was heavily cleared during the 50's and subsequently sown to clover, ryegrass and phalaris to increase carrying capacity. Before long however, erosion spread across the paddock and contour banks were installed, although many later failed. Bushfires in 1989 killed many of the remaining scattered trees and contributed to a rapidly rising water table and dryland salinity. By 1994 the salt levels across the 30 ha paddock had reached between 2 and 3 ds/m (~1600 ppm or ~2,500 EC). Salt scalds appeared and salt tolerant grasses and rushes replaced desirable pasture grasses.



The solution to declining paddock productivity came in the form of direct seeded native trees and shrubs. Some 40kms of direct seeding was established in 1994 in widely-spaced alleys across the contour. By 1996, salt levels started to decline and by 2001 the problem had all but disappeared. Final soil tests showed salt levels of only 0.05–0.07 ds/m (~40 ppm or ~60 EC) or less than 5% of the original levels. This result was so impressive and surprising that it was re-tested three times, all yielding the same results.

The paddock has been transformed. The salt scalds have disappeared, replaced by desirable native pasture species. Old eucalypts, which were almost dead from the salt and insect attacks, are once again flourishing. The area is alive with birdlife.



Recently direct seeded tree lines

Home Among the Gum Trees ?

Based on research and publications by Nicki Taws and Suzi Bond



Superb Fairy Wren



*Striated Thornbill
(J. Robinson)*

Does revegetation provide habitat for native birds? To help answer this, GA teamed up with the Canberra Ornithologists Group (COG) and CSIRO to undertake the *Birdwatch* project in 2000. Thanks to an enormous effort by volunteers, 387 surveys were undertaken on more than 130 sites including 55 private properties in the Capital Region. Some 9,500 birds were sighted from 110 different bird species.

The *Birdwatch* project surveyed sites established by both direct seeding and tubestock and ranging in age from 14 months to 14 years. Seasonal surveys over one year revealed a total of 110 different bird species using the revegetation sites. The most common were small insectivorous birds such as the Superb Fairy Wren, Yellow-rumped Thornbill, White-plumed Honeyeater and Grey Fantail. Particularly exciting was the recording of 15 species of declining woodland birds such as the Crested Shrike-tit, Jacky Winter, Red-capped Robin, Restless Flycatcher and Speckled Warbler.

In 2003, GA and the ANU embarked on an honours project to see if birds breed in revegetation. During spring, 16 of the original *Birdwatch* revegetation and 4 remnant sites were surveyed for bird species, abundance and breeding attempts. Of the 111 species of bird recorded, a total of 44 species were observed attempting to breed in revegetation, 18 of these were woodland bird species, including 4 declining and 2 threatened species.

In a typical Whole of Paddock Rehabilitation site, we would expect to find between 20–30 different species of birds using the revegetation at any one time. Many of these birds are small insectivorous species which perform important pest control services around the farm. Healthy bird communities remove half to two-thirds of leaf-eating insects within tree patches, thereby keeping vital vegetation growing on farms.

For more information on birds in revegetation, please contact GA for a copy of *Bringing Birds Back – A Glovebox Guide for Bird Identification and Habitat Restoration*. The booklet features photos and descriptions of the thirty most common birds, twenty to watch out for and tips and techniques for revegetating to maximise habitat for birds.



References and further reading

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Acknowledgements



Leon & Bubbles Garry

GA would like to specially thank Leon and Bubbles Garry for their ingenuity, innovation and commitment in pioneering Whole of Paddock Rehabilitation and for generously sharing their photos, experiences and lessons learnt. Thanks also to David Marsh, John Weatherstone and Brian Cumberland for their leadership, persistence and tireless efforts toward innovative environmental restoration in the Capital Region.

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Greening Australia's Whole of Paddock Rehabilitation projects are currently being co-funded in the Upper Lachlan and Lachlan Slopes with support from the Lachlan Catchment Management Authority, and as part of the Kosciuszko to Coast program in the Upper Murrumbidgee Catchment, supported by the NSW Department of Environment and Climate Change.

April 2008



**Greening Australia**

