

## Revegetation case study - 2002

### Breakaway Nature Strip

*Gavin & Alison Morgan  
Mission Road*

#### **Landscape Goal**

Provide adequate habitat within the Wallatin Creek Catchment by increasing amount of effective habitat to conserve existing resident flora and fauna in the catchment and improve sustainability of land use.

#### **Nature Conservation**

- Increasing remnant to the minimum patch size required by focal species.
- Providing habitat for locally threatened species.
- Increase water use to improve hydrological sustainability of priority bush areas.

#### **Sustainable Agriculture**

- Increase water use to improve hydrological sustainability of property.
- Provide an opportunity for commercial return from.
- Protecting a highly erodible site.



## Site Characteristics



**Figure 2. Landscape position of revegetation.**

|                                |   |
|--------------------------------|---|
| <b>Soil type:</b>              | Shallow mottled zone consisting of yellow, gravelly soils overlying the mottled zone. Changes to a shallow hardsetting grey sandy loam over clay on the lower part of the site. |
| <b>Landform:</b>               | Ulva - Booraan landscape unit   |
| <b>Remnant Vegetation:</b>     | Approximately 10ha of remnant vegetation.   |
| <b>Vegetation Association:</b> | Tamma / broombush dominated heath changing into a white gum woodland.   |
| <b>Potential Recharge:</b>     | High  |
| <b>Area:</b>                   | Area of revegetation 5.25ha.  |
| <b>Rainfall:</b>               | Average annual rainfall is 330mm, the annual rainfall for 2002 was 220.5 mm with 102 mm in the growing season (May – October).  |
| <b>Paddock history:</b>        | Pasture: pasture  |

## Design of Revegetation

### Species Selection

A natural association of local species was selected based on soil and landforms (table 1).

**Table 1. Species selected for revegetation**

| Genus         | species     | Common name            | Number seedlings | Fire Response | direct seed (g) |
|---------------|-------------|------------------------|------------------|---------------|-----------------|
| Acacia        | acuaria     |                        | 1140             | Seeder        |                 |
| Acacia        | hemiteles   | Tan wattle             | 360              | Seeder        |                 |
| Acacia        | merralli    | Merralls wattle        | 60               | Seeder        |                 |
| Acacia        | neurophylla | Wodjil                 | 180              | Seeder        |                 |
| Allocasuarina | campestris  | Tamma                  | 300              | Seeder        |                 |
| Allocasuarina | acutivalvis | Black tamma            | 240              | Seeder        | 100             |
| Callitris     | canescens   | Native Pine            |                  | Seeder        | 50              |
| Calothamnus   | quadrifidus | One sided bottle brush | 360              | Resprouter    |                 |
| Eucalyptus    | capillosa   | White gum              | 1080             | Resprouter    | 200             |
| Eucalyptus    | eremophilia | Tall sand mallee       | 360              | Resprouter    | 20              |
| Eucalyptus    | erythronema | Red flowered mallee    | 180              | Resprouter    | 50              |
| Eucalyptus    | flocktoniae | Merrit                 | 180              | Resprouter    | 50              |
| Eucalyptus    | pluricaulis | Purple leaved mallee   | 300              | Resprouter    | 20              |
| Eucalyptus    | subangusta  | Black marlock          | 300              | Resprouter    | 161             |
| Hakea         | coriacea    | Pink spiked hakea      | 240              | Seeder        |                 |
| Hakea         | scoparia    |                        | 60               | Seeder        |                 |
| Leptospermum  | erubescens  | Tea tree               |                  | Resprouter    | 45              |
| Melaleuca     | acuminata   |                        | 300              | Seeder        |                 |
| Melaleuca     | coronicarpa | Tangling melaleuca     | 60               |               | 50              |
| Melaleuca     | laxiflora   |                        | 120              |               | 20              |
| Melaleuca     | radula      | Graceful Melaleuca     | 120              | Resprouter    | 50              |
| Melaleuca     | spicigera   |                        | 420              | Resprouter    |                 |
| Melaleuca     | uncinata    | Broombush              | 600              | Resprouter    | 200             |
| <b>Total</b>  |             |                        | <b>6960</b>      |               | <b>1016</b>     |

**Note:** Seeder/Resprouter refers to the main form of regeneration, especially after fire.

### Nature Conservation issues

#### ➤ Focal species requirements

The total area of revegetation and remnant vegetation is equal to 15.25 hectares. Enlarging the remnant to 15.25 hectares from 10 hectares will help meet the spatial requirements of area limited focal species, which require a minimum patch size of 23 hectares. An additional 4 hectares will be revegetated in the 2003 planting.

#### ➤ Natural plant associations

There are three changes in vegetation types across the site; tamma scrub, whitegum woodland and mallee woodland. Each vegetation association includes a mix of 3-4 genera including overstorey and understorey species. This composition of local plants will mimic the natural composition of similar landforms nearby.

➤ **Provenance protection**

Special permission was granted by the Department of Conservation and Land Management to allow all seed to be collected from the neighbouring three Nature Reserves Durokoppin, Kodj Kodjin and Burgess Spring in the Kellerberrin Shire. All lie within a 10-15km radius of the revegetation site. This seed was propagated in selected nurseries for planting into specific sites.

➤ **Vegetation structure**

The seedlings were planted at a density of 1200 stems per hectare averaging three metre spacings. The revegetation site consists of 38% overstorey and 62% understorey of the total number of seedlings. Habitat patches of *Allocasuarina acutivalvis* and *Melaleuca acuminata* were randomly placed across the revegetation site. Each patch consists of a single species, planted at a density of 60 seedlings in 5m x 5m squares at one metre by one metre spacings to create a thicket effect.

➤ **Remnant protection**

The paddock remnant has been used as base points for the revegetation to include age and structure in the revegetation. Revegetating around existing remnants will provide a buffer to protect from edge effects from farming, while fencing the vegetation will provide protection from stock.

➤ **Level of Diversity**

The diversity of plants used reflected the species that were readily accessible and were mature in time for seed collecting and delivery to the nurseries in early December, for propagation in the 2002 planting season. Seven genera and 23 different species of local provenance plants were used in the revegetation design that occurred on similar soil types and landforms.

➤ **Threats to revegetation**

Fire is a significant threat to the revegetation. A mix of species that regenerate after fire by seed or resprouting will improve the probability of plants regenerating after fire.

Dry seasonal conditions at the time of planting and in the following spring could threaten survival rates. Browsing by rabbits, kangaroos, parrots and locusts could threaten the revegetation in the summer after planting.

#### Agricultural land use issues

➤ **Protecting a potentially erodible site**

Rip lines were surveyed along the contour to control surface water runoff and protect the site from potential erosion hazards. The rip lines will aid surface water retention while alleviating waterlogging.

➤ **Increase water use**

A density of 1200 stems per hectare at 3 x 2.7 metre spacings will increase water use and help dry the soil profile. This will be particularly effective in this part of the catchment, as it has been defined as a high potential recharge area.

➤ **Commercial return from local native seeds**

Local provenance seedlings with seed that originated from at least 20-50 parent plants were planted. There were at least 60 seedlings per species planted to ensure enough parent plant material would be available to supply seed. It is possible that seed from each of the species planted will be mature for picking within 3-5 years. The seeds will be a saleable item to seed merchants and local nurseries.

## Establishment

➤ **Site preparation**

The entire site was ripped with the multi tyned ripper in March 2002. The rip lines were cultivated to create an even surface to plant.

➤ **Weed control**

The area to be planted with seedlings was sprayed with 2 litre per hectare of Glyphosate on the 3 July 2001. Late and minimal rains delayed herbicide application with no residual herbicide applied to the site.

➤ **Planting design**

The seedlings were randomly planted with 'potti putki' hand planters. Habitat patches were pegged prior to planting, so that the patches were scattered across the site. Each patch was pegged as a 5m x 5m square. These patches were planted at one metre spacings to create a thicket effect.

The seedlings were grown in 'Col max' hard plastic trays each tray containing 64 seedlings. Only 60 seedlings were allocated, allowing for 4 unplantable seedlings when distributing the seedlings to each planting block.

➤ **Direct seeding method**

Direct seeding area was seeded on the 29 July 2002 by hand broadcasting. One part of seed was mixed with 4 parts vermiculite and 5 parts coarse brown sand as bulking agent in a cement mixer. The seed mix was spread immediately following cultivation. The seed mix was spread using the air seeder across the sites. After seeding, the site was sprayed with 250ml per ha of Talstar® to give 60 days residual control of red legged earth mite.

### ➤ Implementing the revegetation works

The schedule and description of revegetation works undertaken are summarised below for each area.

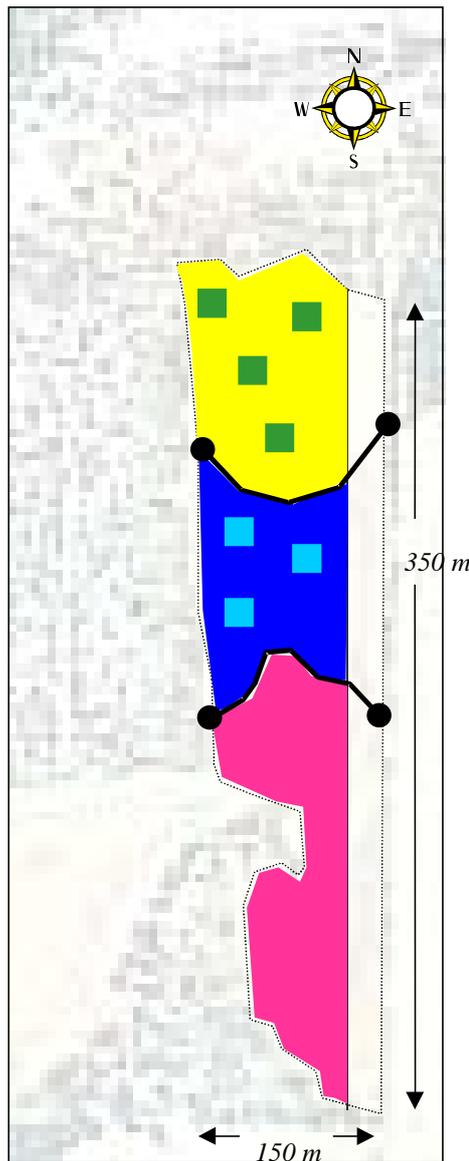
**Table 2. Schedule of Works – Seedlings**

| <b>TASK</b>                                 | <b>ACTION</b>   | <b>OUTCOME</b>   | <b>COMMENTS</b>                                       |
|---|---|--|---|
| <b>Site preparation</b>                     | Multi-tynd ripper 28/3/02, followed by cultivation over rip lines.                                    | Smooth surface to plant without planting into lines.   | Able to conserve moisture over a dry summer & winter. |
| <b>Weed control</b>                         | Previous season of spray topping then, 3/7/02 Roundup 2L/ha, 29/7/02 Roundup 500ml/ha plus 2% wetter. | Very clean site at time of planting. Germination of annual ryegrass on the deeper soils during spring. | Competition for moisture during spring.               |
| <b>Seedling quality at time of planting</b> | Good quality seedlings in prime condition.  | Good survival post planting.   | Ease of handling and planting seedlings.              |
| <b>Planting</b>                             | Hand planting using pottiputki 5 people planting 6720 seedlings over 6 hours.                         | Seedling planted to correct depth and firmly planted.  | Enough time to plant area, good sized team.           |

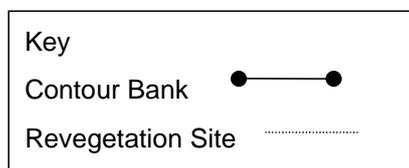
**Table 3. Schedule of Works – Direct Seeding**

| <b>TASK</b>                     | <b>ACTION</b>  | <b>OUTCOME</b>  | <b>COMMENTS</b> |
|---------------------------------|--|---|-----------------|
| <b>Site preparation</b>         | Multi-tynd ripper 28/3/02, followed by cultivation over rip lines using airseeder tynes.   | Smooth surface for seeding, that didn't follow the lines.   |                 |
| <b>Weed control</b>             | Previous season of spray topping then, 3/7/02 Roundup 2L/ha, 29/7/02 Roundup 500ml/ha plus 2% wetter.                                    | Very clean site at time of seeding. Germination of annual ryegrass on the deeper soils during spring. |                 |
| <b>Method of direct seeding</b> | Seed blown onto surface with air-seeder on 29/7/02. Vermiculite and coarse sand as bulking agent. Sprayed with Talstar 30/7/02 250mls/ha | Quick and easy way of spreading seed.   |                 |
| <b>Germination</b>              | Monitoring at monthly intervals.   | No germination yet 22/10/02.  |                 |

### Layout of revegetation



Not to Scale



- SCRUB 30 trays
  - Acacia hemiteles (Tan wattle) 2, A. neurophylla (Wodjil) 3, A. acuaria 4
  - Eucalyptus eremophila (Tall sand mallee) 6, E. flocktoniae (Merrit) 3, E. pluricaulis (Purple leaved mallee) 5,
  - Melaleuca acuminata 2, M. coroncarpa (Tangling melaleuca) 1
  - Patches 5\*5m (1 tray/patch)
    - Allocasuarina acutivalvis (Black tamma) 4
  
- WHITEGUM WOODLAND 49 trays
  - Acacia hemiteles (Tan wattle) 4, A. acuaria 9
  - Allocasuarina campestris (Tamma) 5
  - Hakea coriacea (Pink spike hakea) 4, H. scorparia 2
  - Eucalyptus capillosa (Whitegum) 11, E. subangusta (Black marlock) 5,
  - Melaleuca laxiflora 2, M. spicigera 4
  - Patches 5\*5m (1 tray/patch)
    - Melaleuca acuminata 3
  
- MALLEE 37 trays
  - Acacia merralli (Merrall's wattle) 1, A. acuaria 5
  - Calothamnus quadrifidus (One sided bottle brush) 6
  - Eucalyptus capillosa (Whitegum) 7, E. erythronema (Red flowered mallee) 3
  - Melaleuca spicigera 3, M. uncinata (Broombush) 10, M. radula (Graceful honey myrtle) 2

Figure 3. Planting patterns for revegetation design, (60 seedlings per tray).

## Costs

### ➤ Cost sharing arrangements

The revegetation design was cost shared on its value to nature conservation (Departmental share) and profitable sustainable agriculture (landholder share). This site had a cost shared ratio of 5:3, five points to nature conservation values and three points to sustainable agriculture.

The nature conservation value was met by using a multiple species planting of local provenance that provides an important habitat for locally threatened species and contributes to recharge control of priority bush areas. The sustainable agricultural value was met by the revegetation using water that contributes recharge control, provides a resource for a commercially prospective industry (native seed production) and protects a highly erodible site.

The Bushcare funded, Department of Conservation managed project contributed 46 cents per planted seedling out of a total of 73 cents per planted seedling in the year of establishment (2002). For post planting costs Bushcare funded, Department of Conservation managed project will contribute 17 cents per planted seedling out of 27 cents. The revegetation site was funded at 85% of the cost of fencing materials as the revegetation linked to priority bush areas (Durokoppin Nature Reserve). For details of cost sharing methods see Mullan 2001.

**Table 4. Cost of establishment (2002).**

| Materials and activities              | Itemised costs                     | Total cost       |
|---------------------------------------|------------------------------------|------------------|
| Mixed species seedlings 6960          | @ 35c per seedling x 6960          | \$2436.00        |
| Ripping – @ 2m spacings               | @ 10c per planted seedling x 6960  | \$696.00         |
| Mounding - @ 2m spacings              | @ 7c per planted seedling x 6960   | \$487.20         |
| Pre-planting: 2L/ha Glyphosate        | @ 9 c per planted seedling x 6960  | \$626.40         |
| Hand planting 5 planters              | @ 12 c per planted seedling x 6960 | \$835.20         |
| Fencing –7 line hinged joint ringlock | @ \$1240 per km x 0 km             | \$0.00           |
| <b>Total Cost</b>                     | <b>73 c per planted seedling</b>   | <b>\$5080.80</b> |

## Monitoring

### **16 September 2002**

Good survival post planting with a few deaths observed on the laterite ridge. No germination observed on the direct seeding site.

### **22 October 2002**

Approximately 90% survival, deaths occurred on the shallow laterite ridge. No germination observed on the direct seeding site.



**Figure 4. Breakaway revegetation site, 16 September 02.**