

5.0 Case Studies

5.1 Long Reef kangaroo grass rehabilitation project.

Aim:

To protect and conserve the kangaroo grass (*Themeda triandra*) vegetation community at Long Reef Point.

Objectives:

- To eradicate bitou bush from Long Reef point,
- To rehabilitate existing *Themeda triandra* grassland and enhance this community through regeneration and revegetation,
- To enhance the habitat value of the area, by restoring the original vegetation community,
- To encourage greater community involvement in conservation work,
- To integrate the project with other environmental work being undertaken in the area (such as the 'Save the Dunes' project).

Method:

Prior to the commencement of the project, extensive research was conducted into the optimum planting method for *Themeda triandra*. This work indicated that larger seedlings (mature tubestock) had a much higher success rate than any smaller alternatives (eg virocells, hikos). Furthermore, owing to low local rainfall rates, it was found that the planted tubestock would only survive if they were planted deeply and with a groove and bowl designed to catch and funnel water to the root zone of the plants. Without attention to this detail, the seedlings did not receive sufficient water and perished.

In 1999, the two major bitou bush biological control agents colonised the site. The 'bitou seed fly' and 'bitou tip moth' effectively slowed the rate of spread of the weed at Long Reef. This factor convinced the Reefcare members that it would be possible to overcome the bitou and re-instate the *Themeda* grassland.

Reefcare then established workdays on the first Saturday of every month. Their extensive publicity campaigns have generally encouraged at between fifteen and thirty people to attend the days, in which the main activities are removal of bitou bush and planting kangaroo grass.

Due to the extensive nature of the clearing work on this highly exposed slope, the area was susceptible to erosion. This threat has dictated the pace and methodology of the project. Important points to note are:

- Bitou bush is removed using the "cut and paint" method. This leaves the roots in the soil so they can continue to stabilise the area even though the bitou is gone.
- Bitou is cleared in a mosaic pattern. Hedges of bitou are left to provide windbreaks for new plantings, to break up the slope and reduce erosion potential, and to allow some habitat for small birds to be retained (see figure 5.1).
- *Themeda triandra* (kangaroo grass) is planted into the cleared areas immediately after cutting the bitou.
- Fire has been used extensively to burn the cut bitou bush (see figure 5.2).
- Existing areas of *Themeda* and other native plants have had surrounding bitou bush infestations cleared to allow them to spread naturally (see figure 5.3).

Figure 5.1: Bitou is cleared in a mosaic pattern. Hedges of bitou are left to provide windbreaks for new plantings, to break up the slope and reduce erosion potential, and to allow some habitat for small birds to be retained.

Figure 5.2: Fire has been used extensively to burn the cut bitou bush.

Figure 5.3: Existing areas of *Themeda* and other native plants have had surrounding bitou bush infestations cleared to allow them to spread naturally. This figure depicts a mature *Leucopogon parvifolius* (coast beard heath) surrounded by bitou bush.

Results:

Regeneration of the area was measured using six 1m² quadrats, randomly spread throughout the area. The quadrats were monitored on most months between June 2000 and May 2001.

The data from these quadrats is presented on the following table.

Reefcare monitoring data										
Quadrat	Scientific name	Common name	Numbers of plants or percent spread over quadrat (%) or presence (+)							
			Date							
			3/06/00	1/07/00	2/09/00	7/10/00	29/01/01	1/03/01	7/04/01	5/05/01
1	<i>Themeda australis</i>	Kangaroo Grass	6	5	8	8	33%	50%	70%	100%
	<i>Correa alba</i>	Coastal Correa	1	1	1	1	1	1	1	1
	<i>Commelina cyanea</i>	Commelina	12	16	15%	60%	70%	80%	70%	100%
	<i>Chrysanthemoides</i>									
	<i>monilifera</i> ssp. <i>rotundata</i>	Bitou Bush	159	8	184	61	104	30	15	4
	<i>Trifolium repens</i>	White Clover	2	1	0	1	0	0	0	0
	<i>Anagallis aveneus</i>	Scarlet Pimpernel	0	0	2	0	0	0	0	0
	<i>Solanum nigrum</i>	Deadly Nightshade	0	0	1	2	0	0	0	0
	<i>Carpobrotus glaucescens</i>	Pigface	0	0	1	1	++	++	50%	25%
2	<i>Themeda australis</i>	Kangaroo Grass	100%	100%	100%	100%	100%	100%	100%	100%
	<i>Commelina cyanea</i>	Commelina	some beneath Themeda				+	+	+	+
	<i>Chrysanthemoides</i>									
	<i>monilifera</i> ssp. <i>rotundata</i>	Bitou Bush	0	0	2	0	0	0	0	0
	<i>Themeda australis</i>	Kangaroo Grass	2	2	3	3	3	40%	60%	60%
	<i>Commelina cyanea</i>	Commelina	60 - 70%	80%	80%	85%	+	+	+	+
	<i>Chrysanthemoides</i>									
	<i>monilifera</i> ssp. <i>rotundata</i>	Bitou Bush	27	20	51	2	3	4	0	5
3	<i>Trifolium repens</i>	White Clover	6	4	30	11	0	0	0	0
	<i>Medicago polymorpha</i>	Burr medic	0	1	10	3	0	+	+	+
	<i>Anagallis aveneus</i>	Scarlet Pimpernel	3	2	7	2	0	0	0	0
	<i>Solanum nigrum</i>	Deadly Nightshade	15	3	2	0	0	0	1	0
	<i>Hydrocotyle bonariensis</i>	American Pennywort	0	0	8	0	0	+	+	+
4	<i>Themeda australis</i>	Kangaroo Grass	25%	3	10+ (25%)	10+	100%	100%	100%	100%
	<i>Cynodon dactylon</i>	Common Couch	25%	50%	40%	40%	0	+	+	+
	<i>Stenotaphrum secundatum</i>	Buffalo Grass	1	0	0	0	0	0	0	0
	<i>Chrysanthemoides</i>									
	<i>monilifera</i> ssp. <i>rotundata</i>	Bitou Bush	9	4	30	0	0	0	0	0
	<i>Trifolium repens</i>	White Clover	2	1	17	2	0	0	0	0
	<i>Anagallis aveneus</i>	Scarlet Pimpernel	2	5	0	0	0	0	0	0
	<i>Solanum nigrum</i>	Deadly Nightshade	1	0	2	0	0	0	0	0
	<i>Hydrocotyle bonariensis</i>	American Pennywort	0	0	1	0	0	0	0	0
	<i>Commelina cyanea</i>	Commelina	0	0	0	0	+	+	+	+
5	<i>Themeda australis</i>	Kangaroo Grass	3%	3	2	3	2	2	2	2
	<i>Chrysanthemoides</i>									
	<i>monilifera</i> ssp. <i>rotundata</i>	Bitou Bush	51	112	220	136	45	12	0	0
	<i>Trifolium repens</i>	White Clover			3	3	0	0	0	0
	<i>Solanum nigrum</i>	Black Nightshade			31	58	20	0	4	0
	<i>Medicago polymorpha</i>	Burr medic				1	6	+	+	0
	<i>Carpobrotus glaucescens</i>	Pigface				0	20%	25%	50%	80%
	<i>Ranunculus</i> sp. ???	Buttercup				0	2	30%	20%	20%
6	<i>Themeda australis</i>	Kangaroo Grass					18	40%	40%	40%
	<i>Commelina cyanea</i>	Commelina					+	+	20%	+
	<i>Chrysanthemoides</i>									
	<i>monilifera</i> ssp. <i>rotundata</i>	Bitou Bush			31		8	0	0	0
	<i>Trifolium repens</i>	White Clover						5	0	0
	<i>Medicago polymorpha</i>	Burr medic			2		5	0	0	+
	<i>Anagallis aveneus</i>	Scarlet Pimpernel					8	1	0	0
	<i>Solanum nigrum</i>	Deadly Nightshade			+	0	6	0	4	+
	<i>Hydrocotyle bonariensis</i>	American Pennywort					0	0	+	0
	<i>Scaevola calendulacea</i>	Beach Fan Flower					1	1	1	1
	<i>Dichondra repens</i>	Kidney weed			+	+	+	+	+	+
	<i>Ranunculus</i> sp. ???	Buttercup					+	+	+	+

Discussion

Participation and publicity

This element of Greenlink has had extremely high participation rates throughout the duration of the project. It has attracted the attention of local media, and of various other groups, such as Coastcare, Landcare and NSW National Parks and Wildlife Service. The project earned the runner up award in the 2000 Urban Metro Pride Awards, in recognition of its environmental benefits.

This popularity can largely be put down to a number of factors including:

1. Well developed publicity mechanisms that ensure maximum attendances at work days. This includes media releases, newsletters and a monthly reminder mailout.
2. Well organised, friendly and personal structure, so that volunteers feel welcome, know what is going on and understand what is expected of them.
3. An emphasis on education and recognition of the contributions of individuals.
4. Good supervision on work days. This is provided by the Project Officer, Council and within the group.
5. The provision of morning tea, regular barbeques etc.
6. A range of tasks on any day (eg, clearing, planting, hand weeding, watering) that prevents monotony.
7. An interesting and innovative project that provides a sense of achievement for the volunteers.
8. A beautiful location.

The group leader pays particular attention to making attendance at the work days a fun educational experience. First time visitors are always welcomed and have the rationale of the project explained fully to them, as well as some of the more interesting aspects of the work. At the compulsory morning tea break, there is always a brief presentation and the contribution of various people is acknowledged, adding to the sense of belonging to something worthwhile.

The issue of adequate supervision has been a constant presence with this group. At times, the large number of people attending the work days has meant that supervision has been less than optimal. This has placed pressure on members of the group to assume the role of supervisor, which some of them have responded well to. The best option seems to be to have a paid supervisor, as well as the Project Officer attending the work days. When this occurs, the leader of the group has more freedom to actually participate in the work.

Environmental outcomes

The removal of bitou bush over this large area has increased the potential area of *Themeda* grassland dramatically. This has obvious benefits for the animals dependent on this habitat for their survival; there are already anecdotal observations of an increase in the number and diversity of birds in the area since the work has begun.

The results of the monitoring indicate:

- The planted *Themeda* has had a high rate of success (approx 90%).
- This grass does not spread quickly naturally, as the seed possesses a sharp point and awn that enables it to penetrate the ground immediately after falling from the flower stalk.
- The bitou bush may have inhibited the natural germination of *Themeda*.
- Fire may be useful in overcoming this inhibition effect, judging by the regeneration displayed in the burnt areas. Many species germinated in these areas.
- Fire may also be useful in destroying some of the bitou seed bank, as germination rates of the weed were lower in some of these burnt areas. This is probably related to the intensity of the fire.
- In other burnt areas, germination rates of bitou was very high, immediately after the burn. This allowed for a shorter follow up period and for the use of sprayed herbicide in certain spots.
- Tubestock have a higher rate of success than smaller *Themeda* seedlings (eg virocells).
- Attention must be paid to planting methods, especially on steeply sloping ground. This is critical to ensure that the new plantings get sufficient water in the early stages of development.
- Adequate watering is also critical to the establishment of the tubestock.
- Many new weed species invaded the site after the bitou was cleared. These included *Medicago sativa*, *Melilotus indicus*, *Solanum nigrum*, *Trifolium repens*, *Anagalis aveneus*, *Modiola caroliniana* and a variety of grass weeds. A higher level of hand weeding was necessary, especially during spring to keep these weeds from inhibiting the growth of the newly planted areas.
- Several native species have recolonised the area post clearing, particularly in the burnt areas (see figure 5.4). These include *Carpobrotus glaucescens* (pigface), *Commelina cyanea* (scurvy weed), *Dichondra repens* (kidney weed) and *Clematis aristata* (old man's beard).

Erosion and associated problems

Clearing the bitou infestations in a mosaic pattern has been effective in preventing erosion. There has been minimal movement of soil, even on the steeper slopes of the sites throughout all of the clearing. The mosaic pattern has also allowed for the remaining bitou bush to act as a windbreak and shelter for the newly planted areas. Therefore for exposed areas, this method is highly recommended.

One of the problems with mosaic clearing is that it is sometimes difficult to restrict the amount of bitou cleared by the volunteers. Even when the areas were marked out with stakes and tape, there were times when more bitou was cleared than was required. The only way to prevent this is by having additional supervision or smaller work groups.

The possibility of erosion in bared areas has been reduced by the policy of planting on the same day as clearing. Although this makes follow up work more difficult, it ensures that the clearings are stabilised by the grass in the minimum time.

The soil on the site was relatively stable shale based soil. The adjacent dune area is highly unstable and influenced by runoff from the headland above. Ultimately, the bitou on the dunes will have to be removed, but at present, any work in this area would be too risky. Reefcare has attempted to ameliorate this problem by contouring the slope, installing sediment fences, covering the exposed soil with jute mesh and planting coastal heath plants into the area directly above the most erosion prone area (figure 5.5). When this area is stable, a decision will be made as to how to proceed in the dune area.

Figure 5.4: Several native species have recolonised the area post clearing, particularly in the burnt areas. These include *Carpobrotus glaucescens* (pigface).

Figure 5.5: By contouring the slope, installing sediment fences, covering the exposed soil with jute mesh and planting coastal heath plants into this area, it is hoped that the unstable soil below will be protected from erosion. This work was completed by TAFE students.

Supply of Themeda

The lack of *Themeda* available from the local tubestock nurseries has sometimes slowed the pace of clearing. Although sufficient quantities were ordered at the beginning of the year, low seed yield, difficult growing conditions and variable germination rates meant that supply was sometimes erratic.

This was at times frustrating, although the slowed rate of clearing enabled more attention to be given to maintenance of completed work. It also meant that the volunteers were able to learn new skills, such as weed identification.

Fencing

The fences surrounding the planted areas are in a poor state of repair and will need to be upgraded in the near future to prevent pedestrians from entering the area.

Warringah Council has also been approached to provide fencing in a new area of clearing that is to the east of the current area. This location will need to be fenced before any more clearing proceeds owing to the high volume of pedestrian traffic in the area. However, the Council is presently unable to fund this.

Conservation Volunteers Australia

Volunteers from *Conservation Volunteers Australia* (CVA) have been present at most of the monthly work days. The contribution made by this group has been excellent in supporting the work performed by the Reefcare workers. The site has also been very popular amongst the CVA workers, with many of them returning several times.

However, this contribution has not been without its problems. This is particularly so when there has been a high ratio of volunteers to supervisors; the usual number of volunteers has been between 6 and 10, but has been as high as 18. Clearly, this is far from ideal, especially on an site as environmentally sensitive as this.

Conclusion

The Reefcare project represents a highly successful community / Council partnership. The amount of hours dedicated to this project by the volunteers has been quite extraordinary, and the ongoing commitment to the site is inspiring. In addition to this, the positive environmental outcomes of the work are plainly evident.

The true success of this project will only be known in years to come, as the planted *Themeda* becomes fully established and the bitou bush is prevented from re-establishing itself. This will require a continuing long term commitment from the Reefcare volunteers, and a high level of support from Warringah Council.

5.2 *Dee Why Lagoon Wildlife Refuge rehabilitation project.*

Background

The site of the Friends of Dee Why Lagoon's project is on the southern side of the lagoon, adjacent to a mown recreation area on Richmond Ave. This group has been working in the area for over twenty years.

Aim

To protect and conserve the vegetation and habitat of the Dee Why Lagoon Wildlife Refuge.

Objectives

- To enhance the habitat value of the area, by restoring the original vegetation community,
- To encourage greater community involvement in conservation work,
- To eradicate the weed infestation that is currently threatening the health of the adjacent Estuarine Paperbark bushland (part of the Endangered 'Sydney Coastal Estuary Swamp Forest Complex' Ecological Community).
- To improve habitat connectivity along the boundary of the Dee Why Lagoon between the dunes and the core area of *Eucalyptus robusta* woodland.

Methods

The primary task of this project is to excavate approximately 500m³ of builders' rubble that was dumped in the area in the 1960s and 70s over an area of approximately 550m². This material will then be spread over the adjacent open space and turfed (see figures 5.6 and 5.7).

The excavation will result in a steep bank (approximately 1:2 slope), which will be covered in crushed sandstone and then planted into. Plantings will consist of locally sourced endemic sedges and shrubs.

The excavated area will be left unvegetated to allow the existing adjacent vegetation community to regenerate naturally in the bared area.

This work will allow the brackish lagoon water to cover a larger area during times of high water. Observations over a long period have lead the project proponents to the conclusion that the brackish water will control the naturalised weeds in the excavated area including *Ipomoea indica* (morning glory) and *Ageratina adenphora* (crofton weed).

Figure 5.6: Landscape Plan for proposed wetland rehabilitation work.

Figure 5.7: Site of the Friends of Dee Why Lagoon proposed wetland rehabilitation project.

Figure 5.8: Council staff have recently installed fencing along the perimeter of one of these areas to limit public access and formalise a “no mow zone”. The fence incorporates a 30cm strip of filter fabric that is effective in preventing weed seed being flicked into the bush by lawn mowers.

Results

This project has not proceeded past the planning stages due to a range of problems. The originally proposed completion date was approximately November 2000.

After several meetings and many discussions with Council Officers throughout 2000, it was decided that the project would require the submission of a Development Application with concurrence from the Department of Land and Water Conservation (DLWC) for integrated development, as well as an eight part test, owing to the endangered community nearby. These documents have then been scrutinised twice by DLWC and several units within the Council.

This process was concluding in August 2001 and the project appeared to be close to being granted permission. However, we were then told that under the provisions of the new Local Environmental Plan, any Development Applications for areas of public land that do not have a plan of management cannot be given approval. As the Dee Why Lagoon Wildlife Refuge does not yet have a plan, it seems that the work cannot proceed without special permission from the Council.

Discussion

Stymied by bureaucracy

This project demonstrated a high level of commitment from both the local community and the Council. The Friends of Dee Why Lagoon devised the concept and managed to get the support of Warringah Council's Conservation and Land Management staff in proceeding with this innovative approach to weed control and habitat management.

The preliminary work and outline of the plan was completed before the grant application was submitted. This included flora and fauna surveys and a study of the soil and hydrology of the site. A basic plan was drawn up in collaboration with Council Officers. These all indicated that the work was feasible, worthwhile, and had the necessary support from the land manager. The project was therefore included in the Draft Plan of Management.

In spite of this collaboration with the Council, the group has been unable to commence the project owing to the problems outlined in the Results. The major problem appears to be that at each stage of the project's development, a different unit in Council has been responsible for advancing it. The communication between the units has not allowed for the smooth implementation that the community group had hoped for.

Furthermore, the processes involved in implementing this project appeared to be different to those encountered in a typical development (such as a commercial building or a house). This is probably due to the sensitive and public nature of the land on which it is proposed. As a result, approvals from each of the necessary units and agencies have taken longer than might normally be expected.

The major problem that has been caused by the delays is that the group has found it difficult to maintain morale and interest amongst its members. Like many groups, its membership is aging and recruitment is difficult. Some of the members saw this project as a way of raising the interest levels of existing members and possibly generating interest from local residents.

They were also very eager to implement the project before the Estuarine Paperbark community and surrounding vegetation is further invaded by weeds. The delay has generated a feeling of disappointment that their good intentions and innovative approach to weed control are being stymied by bureaucracy.

Successful bush regeneration, burns and fencing.

However, this has not dampened the enthusiasm of the group for the regular bush regeneration sessions that have been highly successful in controlling weeds and encouraging regeneration of the native vegetation communities over several hectares of the Wildlife Refuge. Council staff have recently installed fencing along the perimeter of one of these areas to limit public access and formalise a “no mow zone”. The fence has incorporated a 30cm strip of filter fabric (see figure 5.8) that is effective in preventing weed seed being flicked into the bush by lawn mowers.

They have also cooperated with the local bush fire brigade to proceed with two ecological burns in the last three years. The first of these has yielded extremely good results in encouraging germination of *Eucalyptus robusta* and various other natives that have been in decline in the area for some time. The second fire was too recent to be able to judge its success.

The work performed by the community group complements that done by the Council’s contractors who have been working throughout the refuge for a number of years. Greenlink has been successful in improving communication between the contractors and the community group, and this has helped to maximise the outcomes of the work in the southern part of the reserve.

Council has now employed a contractor to assist in the supervision and technical support of the volunteers. This has proved to be an excellent system, and has given some of the volunteers the confidence and technical abilities to expand their work into new areas.

Conclusion.

The major lesson that can be drawn from this exercise is that if the project goes beyond simple bush regeneration, revegetation and habitat restoration, a higher level of support is necessary. In this case, it proved inadequate to have the support of Conservation and Land Management officers, as the project needed a higher level of approval. The initial support of these officers led to the assumption that the project could proceed with scrutiny at this level alone, however this proved to be incorrect.

If a similar project is to be repeated elsewhere, it should be assumed that a high level of permission will be needed. This would then allow the proponents to factor in adequate time and money for the due processes to be followed. It would also enable them to follow the correct approval procedures from the outset.

However, even allowing for this would not have prepared the Friends of Dee Why Lagoon for the eventual refusal of the project based on a technicality that many of the Council’s own staff were not aware of, as the Local Environment Plan was only adopted at the end of 2000.

The Friends of Dee Why Lagoon are determined to proceed with this worthwhile project, as they are dedicated and convinced of its ecological benefit. The continuing support and assistance from Council staff has been greatly appreciated and will be necessary to see the project through to completion.