

Yarra Bend Park
Flying-fox Campsite:

Review of the Revegetation Plan



**Yarra Bend Park Flying-fox Campsite: Review
of the Revegetation Plan**

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About this review

This Review is part of a set of three review papers addressing the effectiveness of the 2005 Yarra Bend Park Flying-fox Campsite Management Plan. The other two are:

- Yarra Bend Park Flying-fox Campsite: Review of the Management Plan
- Yarra Bend Park Flying-fox Campsite: Review of the Scientific Research.

These three Reviews have been prepared for consultation purposes and to inform the development of a new Yarra Bend Park Flying-fox Campsite Management Plan.

Executive Summary

In 2005, the Department of Sustainability and Environment (DSE) developed five-year a Flying-fox Campsite Management Plan for Yarra Bend Park to

“provide a clear framework for managing Melbourne’s flying-fox colony at Yarra Bend Park and creating a sustainable campsite”.

This is a review of the Revegetation Plan component of the 2005 Campsite Management Plan and it has been conducted by Practical Ecology, the ecological consultants who developed the original plan and whose personnel have been involved with restoration works since then.

Four methods were used to review the effectiveness of the revegetation works:

1. Reviewing specific management works and their effectiveness in each original habitat block.
2. Direct comparison of habitat scores between 2004 and 2009.
3. Comparing photos between 2005 and 2009.
4. Consulting with workers and others on the site about their views on the effectiveness of the works.

The habitat hectare data indicates significant improvement in overall habitat values on the site over the past five years.

The changes in key parameters of habitat scoring are variable:

- Canopy cover has remained static.
- Understorey and lack of weed scores have increased across many Habitat Zones.
- Changes in recruitment score are variable, with many Habitat Zones showing marked increases and many staying steady over time.

- Litter scores have shown no or only slight increases over time.
- The log scores have also generally remained steady.

Overall, habitat scores have increased markedly in sites where intensive works have been undertaken as expected within parameters that would be affected by works.

Canopy health is a significant concern on the site. It is possible that the impact of roosting flying-foxes may be causing stress to individual Red Gums but understorey enhancement may be helping to maintain their health.

Recommendations and Conclusions

The revegetation works have been well-implemented and vegetation levels have been dramatically increased on the site. However, it is unclear at this stage whether this improvement in vegetation cover and diversity has resulted in improved flying-fox habitat and new roosting trees.

The focus for the next few years should be on consolidating the revegetation efforts. The plantings to date have been very successful but are not fully established and without strategic maintenance the weeds will re-invade.

Background

Background and purpose of the review

The Flying-fox Campsite Management Plan for Yarra Bend Park was prepared in 2005 to “provide a clear framework for managing Melbourne’s flying-fox colony at Yarra Bend Park and creating a sustainable campsite”.

An integral part of this management plan was the Revegetation Plan, which was designed to guide intensive works to improve vegetation quality and habitat on the site over time.

Now, in 2009, the Campsite Management Plan is in the process of being renewed. To feed into the renewal process, three reviews have prepared:

1. Review of the Campsite Management Plan
2. Review of the Revegetation Plan (this report)
3. Review of the Scientific Research

This is the Review of the Revegetation Plan for the Grey-headed Flying Fox Campsite at Yarra Bend Park. The goals of the 2005 management plan and the history of implementation will provide the background for reviewing the effectiveness of the works on the site through qualitative and quantitative methods detailed below.

The 2005 Campsite Management Plan identified five major goals with one of the goals being specifically addressed in the Revegetation Plan:

Enhance vegetation and other environmental values in and near the campsite.

The Revegetation Plan provided more detail to the general goal of the Campsite Management Plan, including several “principles for designing and implementing rehabilitation works”:

- Creating or maintaining a cool, humid, sheltered environment with roosting structures appropriate for Grey-headed Flying-foxes.
- Replacing invasive weeds with indigenous species.
- Encouraging the regeneration of indigenous species.
- Revegetation of missing indigenous species.
- Retaining nutrients on site and dealing with naturally introduced species.
- Ensuring stable, maintainable areas of revegetation/rehabilitation.

The Revegetation Plan also provided a simple method for “measuring project results: habitat-hectare site assessment”. The site was divided into 16 areas of different Ecological Vegetation Classes of varying quality where habitat scores were collected in 2004. The plan of habitat zones is presented in Appendix 1.

The Regeneration Plan also:

- Identified specific “target areas for works.”
- Detailed “weed control methods.”
- Described the need and approach to “integrating weed control, regeneration and revegetation.”
- Provided general “revegetation methods” with the provision of vegetation templates based on Ecological Vegetation Classes based on locally occurring species.

Ecological consultants, Practical Ecology, developed the original Revegetation Plan and have been involved with restoration works on the site since they commenced in 2005. This review is therefore based on first-hand, ongoing knowledge and involvement with the site and includes the reflections and contributions of others working at the site.



History

History of implementation

The principles and detailed recommendations in the 2005 Revegetation Plan guided the development of several contracts for works over the past four years. The following table lists the works plans and the general activities that were defined.

Works Plan	Activities
Habitat Restoration for Flying-fox Roosting Site, Yarra Bend Park	Works were limited to the east bank of the Yarra River and extended from the viewing area in the south-eastern extent of the roosting to the point where the river flows from the east in the areas of existing forest. The works included weed control, erosion control and revegetation.
Wetland Planting Specifications for Yarra Bend Flying-fox Management Area	Works were limited to the constructed wetland on the east bank of the Yarra River in the south-eastern corner of the site and included site preparation and weed control, terrestrial and wetland planting, plant protection and maintenance of the plantings.
Habitat Restoration Works 2006-07 for Flying-fox Roosting Site, Yarra Bend Park	Works included the east bank of the Yarra River, again extending from the viewing area in the south-eastern extent of the roosting to the point where the river flows from the east, and the west bank in the northwest and north of the roosting site. A key goal of the works was to establish trees and shrubs as the future canopy of a forest in a paddock south of the freeway. The works included weed control, revegetation and fencing.
Stage 4 2008/09 – Grey-headed Flying-fox Management Area, Yarra Bend Park.	Works included the east bank of the Yarra River, again extending from the viewing area in the south-eastern extent of the roosting to the point where the river flows from the east, and the west bank in the northwest and north of the roosting site. The works included weed control, revegetation, park furniture and track maintenance.

Methods of review

History of implementation continued

Each works plan provided a different set of 'management blocks' as a framework for identifying works. However, these blocks did not correspond directly to the original habitat zones defined. The management blocks were designed to facilitate the specific goals for the works defined in the contracts.

Works were distributed generally within management blocks and specific wetland sites. The goal was to provide easily costed units wherever possible, for example specific numbers of plants to be installed with plant protection, to enable the fairest possible comparisons between tenderers. General tasks such as weed control were defined in as much detail as possible, for example specific species in management blocks, but are inherently difficult to describe in detail and any costs provided by tenderers are simply estimates to complete a general task.

Specific prescribed numbers of plant species were identified for each management block although the detailed placement of the plants was left to the selected contractor, in consultation with the contract superintendent, Parks Victoria. The intention was to provide easily costed quantities of revegetation but to leave the appointed contractor to conduct weed control and fill groundstorey gaps created with indigenous planting.

Weed control works were targeted within management blocks as well. In each contract specification weed species to be controlled and the methods to be used were detailed. General performance objectives for weed control were also defined.

Four methods were used to review the effectiveness of the works over time:

- 1 Reviewing specific management works and their effectiveness in each original habitat block as defined in the 2005 Revegetation Plan.
- 2 Direct comparison of habitat scores between 2004 and 2009. The forms used for habitat scoring were almost identical in 2004 and 2009, although EVC benchmarks used have been changed slightly in format over that time. Scoring on 8 and 13 July in 2009, repeated the large old tree and neighbourhood scores from the first scores in 2004 as it was assumed that they would not change significantly.
- 3 Comparing photos between 2005 and 2009. Photographs prior to and during works in 2006 were obtained from the Australian Research Centre for Urban Ecology (ARCUE) and views of the same sites were gathered in August 2009 for comparison.
- 4 Consulting with workers and others on the site about their views on the effectiveness of the works.

Limitations of data collection: habitat-hectare scoring


Areas previously excluded from assessment

In the 2005 Revegetation Plan there were two areas where habitat-hectare assessment was not undertaken in 2004 because of insufficient native vegetation cover but which were recommended as possible sites for revegetation as future habitat for the flying-foxes.

In both of these areas, extensive revegetation work has since been undertaken. Comments are entered at the end of the table in Appendix 2 – Condition Changes in the 16 Habitat Zones under 'Other Areas'.

Limitations – areas

Assessing the difference across whole Habitat Zone areas from 2004 to 2009 is difficult where work has only been done in portions. This has resulted in some of the areas now showing significant improvement as well as some showing similar or worse conditions than 2004. This tends to level out the scores for those areas. It may be worthwhile considering dividing some sites in the future in order to better compare similar areas more accurately.



Results

Limitations – large old trees

In the Escarpment Shrubland Habitat Zones from 2004 there was no record of large old trees collected, but definitely in some others (for example in Habitat Zone 7), because the EVC benchmark used in 2004 did not include the parameter. This is one reason for excluding counting large old tree scores in Escarpment Shrubland in this review despite the updated EVC benchmark used in this assessment including a large old tree score. Also, in 2004 there were some areas that did receive a large old tree score but accurately determining the boundaries used in 2004 is difficult and may introduce greater inaccuracy. Therefore the 2004 large old tree score has been maintained. The Habitat Zones that did not receive a large old tree score have had their habitat hectare score adjusted so that it is now a score out of 90 and not a score out of 100.

The precautionary principle issue

Some of the 2004 scores have been lowered in the Habitat Quality Comparison tables, to account for changes in the assessment approach over time (a full rationale is provided in Appendix 3).

Habitat Quality Comparisons

Once habitat scores were collected in 2009 they were compared with previous 2004 scores in two ways.

The first method was to compare specific scores that were likely to change over time. Only selected parameters are likely to change over five years in response to the works implemented. The data on logs should be taken with caution as no efforts were made to import logs and any changes are likely to be slight confusion over boundaries of Habitat Zones.

The next comparison made was between the overall habitat scores. Adjustments to scores have been made for consistency between the two scoring assessments as discussed above.

Changes in Habitat Zones

Overall changes in habitat score in each zone were also considered (Habitat Zones are shown in Appendix 1). Table 2 summarises the changes in condition for each Habitat Zone (a more detailed table is provided in Appendix 2). Assessing the change in each area over time is inherently a subjective process but provides insight into the outcomes achieved over the past five years.

Substantial improvements in vegetation cover and habitat diversity is readily apparent in most of the roosting sites and across most of the site.



Results

Table 2 – Summary of condition changes in the 16 Habitat Zones

Habitat Zone No.	EVC	Change in Habitat Score (2004–09)	General Condition in 2009	Comments and Improvements
1	Plains Grassy Woodland	+10	This section is in good health.	It does not contain any large old trees however and the understorey is not overly diverse.
2	Floodplain Riparian Woodland	+17	<p>The areas where works have been done have greatly improved.</p> <p>Some parts of the area in the north-east are unchanged from 2004. The section where revegetation hasn't occurred has a significant cover of introduced weeds.</p> <p>The section adjacent to Habitat Zone 4 and Habitat Zone 5 is also weedy.</p>	<p>From roughly the end of the river bend downstream to about Habitat Zone 4 there has been significant revegetation work and weed control undertaken.</p> <p>Natural recruitment has improved but is still limited. Litter and understorey have improved.</p>
3	Escarpment Shrubland	+4	Minimal weed control occurred after an initial broadscale weed control effort. A weedy understorey occurs around the planted trees and shrubs.	Requires weed control around planted tubestock and guards and possibly infill planting with sturdy groundstorey tussocks.
4	Plains Grassy Woodland	+19	Significant work has occurred in this area with extensive weed control and understorey planting.	<p>There has been a significant improvement since 2004.</p> <p>Continuing weed control and targeted infill revegetation is required here to consolidate existing works.</p>
5	Escarpment Shrubland	+17	The ground cover is in very good health.	Needs control of agave and tradescantia.
6	Floodplain Riparian Woodland	-7	Canopy cover is poor where flying-foxes are roosting and the abundance of flying-foxes makes working difficult and they may be contributing to the significant amount of weeds.	<p>Urgent weed control may be appropriate.</p> <p>Review of wetland and future works may be needed.</p>



Habitat Zone No.	EVC	Change in Habitat Score (2004–09)	General Condition in 2009	Comments and Improvements
7	Escarpment Shrubland	+1	Canopy cover is poor where flying-foxes are roosting and the abundance of flying-foxes makes working difficult. The other section of the canopy is in good health.	Weed control and revegetation required. Good choice of future site for improving habitat values since it is close to the current flying-fox roosts and already has the "bones" of a good habitat structure.
8	Plains Grassy Woodland and Box-Ironbark Forest	+3	General improvement in areas where slashing has been discontinued has resulted in recruitment of ground storey graminoids and where revegetation has been done with indigenous groundstorey plantings.	Understorey recruitment of pioneer species (silver wattle) resulted where slashing was stopped. Where this has occurred there are less grassy weeds and it will potentially result in recruitment of groundstorey indigenous species. Control of mountain bike riding needed.
9	Escarpment Shrubland	-3	Minimal weed cover. Recruitment of the understorey is occurring but is only moderate.	There is more recruitment of groundstorey which includes some planting. Revegetation of graminoids by the side of the path should be continued throughout the rest of the site.
10	Floodplain Riparian Woodland	+1	Extensive revegetation has occurred transforming the area. Canopy health is roughly the same as in 2004. Understorey recruitment occurring to a moderate extent but could possibly be encouraged further.	The score does not fully reflect the site condition, partly because the recruitment score has decreased since 2004. This may be due to restoration work reducing opportunity for natural recruitment.



Results

Table 2 – Summary of condition changes in the 16 Habitat Zones continued

Habitat Zone No.	EVC	Change in Habitat Score (2004–09)	General Condition in 2009	Comments and Improvements
11	Plains Grassy Woodland	+16	Aside from underneath the flying-fox roosting area and the wetland area the rest of the polygon is dominated by weeds. Central zone has poor canopy health where flying-foxes are roosting and works are difficult to implement.	Underneath flying-fox roosting sites: weed control done well and revegetation has taken well including trees 2.5m – 5m high. Weeds in wetland area vastly improved, some recruitment of River Red Gums, good aquatic margin and logs introduced.
12	Box-Ironbark Forest	+15	Little to no weeds overall. Some recruitment is occurring.	Erosion on the trail needs control. Perhaps the judicious introduction of missing groundstorey species could be initiated.
13	Box-Ironbark Forest	+9	Appears mostly unchanged despite increase in score. Virtually no weed cover.	Fence needs to be repaired.
14	Escarpment Shrubland	+16	Weed cover dramatically reduced.	Vast improvement since 2004. Control of a few woody weeds still required: boxthorn and peppercorn.
15	Plains Grassy Woodland	+1	No change. Where earthworks have taken place the 2004 scores are not representative since the vegetation has been cleared to bare earth.	
16	Box-Ironbark Forest	+21	Substantial revegetation work has enriched species diversity at the site. Litter has accumulated. Many major weeds have been eradicated.	Weed control should continue.
17	Other areas	+n	Dense eucalypt “thicket” like revegetation work done with juvenile trees up to 1m – 1.5 m in height in the area bounded by the freeway and Habitat Zones 1, 2 and 3. This area was previously un-vegetated and contains only a small amount of diversity. The slope area between Habitat Zones 3 and 4 also has had some significant revegetation work done.	



Comparisons of Photopoints between 2005 and 2009

Comparing older photographs and more recent photos proved more difficult than anticipated. A selection of photographs provided by ARCUE were reviewed to determine if any clear sites or points could be determined for comparison.

The abundance of successful revegetation works make comparisons very difficult. Large portions of the site

have had middle storey shrubs and trees planted over the five years and many of them have grown substantially, cutting off views and making trees and other landmarks difficult to see. It was difficult to find good clear views for comparisons. There has been a substantial transformation of the site and the search for comparable photos clearly demonstrated these changes.

Before and after photographs of four sites indicates good results. The small area sampled by the photographs are indicative of larger areas restored through the works implemented on the site.

Path from viewing platform towards Bellbird Carpark, January 2006



Same location in August 2009



Path leading off hill in May 2006



Same location in August 2009 with extensive revegetation cover



Results

Comparisons of Photopoints between 2005 and 2009 continued

Wetland works in May 2009



Same wetland in August 2009



Wetland at installation
stage in May 2006



Same wetland in August 2009





Discussion

Overview of improvement over time

The habitat hectare data indicates significant improvement in habitat values on the site over the past five years.

The changes in key parameters of habitat scoring are variable:

- Canopy cover has remained static and is probably a factor of consistent pressure of roosting flying-foxes affecting the average canopy cover and preventing changes.
- Understorey and lack of weed scores have increased across many Habitat Zones. This is a consequence of the extensive weed control and planting works that have occurred.
- Changes in recruitment score are variable, with many Habitat Zones showing marked increases and many staying steady over time.
- Litter scores have shown no or only slight increases over time. This is as expected, as litter accumulation is a slow process.
- The log scores have also generally remained steady except in areas where logs have been intentionally added, such as in the constructed wetlands.

Overall habitat scores have increased markedly in sites where intensive works have been undertaken. Even with the possible subjectivity of habitat scoring between different observers there are significant increases that have occurred. In Habitat Zones where there is little increase in habitat scores there were very few works implemented.

Canopy health is a significant concern on the site. It is possible that the impact of roosting flying-foxes may cause stress or kill individual Red Gums. In such a case, the animals may move on to other trees, as occurs in roosting sites elsewhere. However, this does not appear to be occurring to a significant extent at this site; some of the trees are stressed but they are still alive. It is possible that the reintroduction of a shrub and small tree layer over the past five years which has probably enhanced the ecosystem, may be slowing the decline of individual trees as well.

Review of program goals and effectiveness

Weed control

Weed control has been extensive across the site. Some weeds, such as Kikuyu and Boneseed, which were abundant in many areas of the site are now notably absent. Eradicating Kikuyu has been a key objective in selected areas because it is a 'transformer' weed that can dominate the groundstorey of sites preventing all regeneration and transforming the ecosystem significantly over time.

Unfortunately indigenous vegetation hasn't always replaced the swards of Kikuyu. In many cases Panic Veldt Grass and other small exotic grasses have replaced it but there are still substantial gaps and bare spaces that were not available when Kikuyu prevented all regeneration. The almost complete eradication of Kikuyu from large areas of the site should result in significantly improved recruitment of indigenous species over time.



Discussion

Review of program goals and effectiveness continued

Erosion control

Erosion control has been very successful on the site with most areas stabilised. No issues of significant concern were observed on the site during the development of this report.

Regeneration and revegetation works

There has been extensive planting over the past four years and there is evidence of the success of the works through a simple inspection. The observations in this review clearly indicate that there have been substantial successes in establishing new plants through revegetation and regeneration. Plant survival across the site has generally been very high, despite dry conditions. This may be due to the moist nature of the site and the good maintenance of the plantings. It was also noted that the tree guards appear to have protected the plants from grazing by possums.

Specific issues

Central eastern wetland hydrology

The drainage that was intended to go into the wetland is not effectively reaching the basin. The drainage works need some minimal alterations, preferably with a spade, to allow more water to flow into the wetland.

Plant placement in EVC Zones

Plants have not always been placed in the proper EVC zones. In parts of the site, a small percentage of plants have been planted in inappropriate locations, i.e. Hedge Wattles (*Acacia paradoxa*) planted too close to the river and River Bottlebrush (*Callistemon sieberi*) planted too high above the riverbank. Plants such as these are now growing in areas they would not have formerly occurred. This issue will require specific attention in any future planting.

Groundstorey revegetation

Groundstorey revegetation and maintenance is labour intensive work. Maintenance must continue for several years to ensure that the initial investment in planting is rewarded. In the fourth year much of the required work is weeding around the older plantings. It is clear that this will need to continue in order to consolidate those plantings.

Provenance of plants

Many of the plants used in the revegetation works were not grown from seed collected within Yarra Bend Park. Some plants have been grown from seed collected from elsewhere in Melbourne. This is a difficult issue as the 'proper' provenance is always open to question.

However, in this case, given the isolation of Yarra Bend Park from other remnants, it should be a clear requirement of the next Management Plan that plants are grown from local seed. This requirement should also be clarified in future contracts. Regardless of who grows the plants, the seeds used should be collected from remnant vegetation in Yarra Bend Park.

Pathway maintenance

This issue does not directly concern the revegetation issues but has been included in the recent revegetation works contracts.

Many of the path edges supported by edging are buckling under the pressure of the track and its users. Mountain biking is occurring along the track and causing stress on the track as well. The original edging is also quite thin and weak.



Recommendations and Conclusion

Recommendations for the next Management Plan

The focus for the next few years should primarily be on consolidation of the revegetation efforts. The plantings to date have been very successful but are not fully established and without strategic maintenance the weeds will re-establish themselves to some degree. Given the already extensive plantings, funding should be primarily directed towards maintenance and encouraging regeneration before continuing to expand planting areas.

Weed control also needs to be continued. High threat weeds such as Kikuyu and Boneseed are almost eradicated from much of the site but a little effort is required to remove the final small populations.

Replacing the thin edging on the path with sturdier edging and stakes should be a high priority in the near future to prevent breakdown of the path.

Conclusion

It is clear through the assessment and monitoring work that has been done on the site that the works were well-implemented and that the habitat quality levels have been dramatically improved on the site.

The issue that is as yet unclear is whether or not this improvement in vegetation cover and diversity has resulted in improved flying-fox habitat and new roosting trees.

As determined through habitat score comparisons, the canopy of Red Gums (*Eucalyptus camaldulensis*) seem to be consistent over time. It would appear that the flying-foxes are not killing trees through intensive roosting but certainly reducing canopy health.

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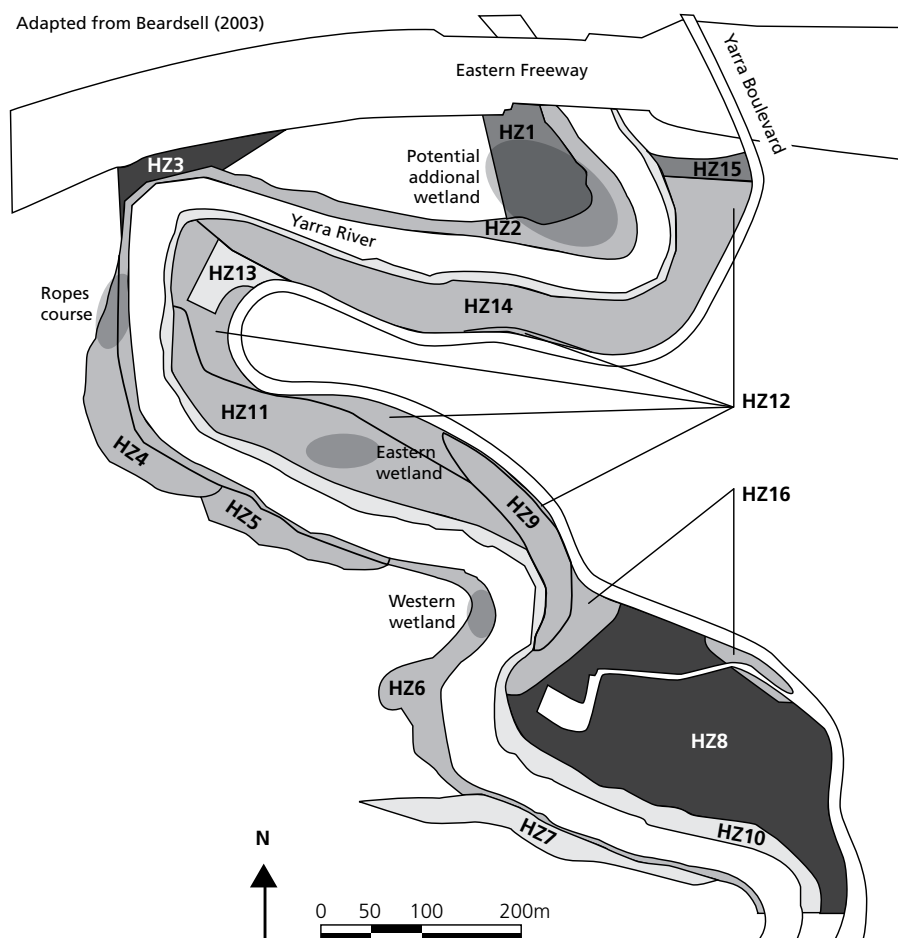
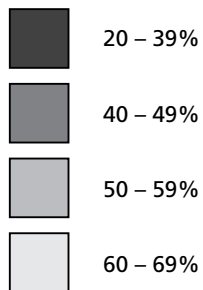
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Appendix 1

Map of Habitat Zones and Habitat Score Ranges in 2005

Habitat scores:



Appendix 2

Habitat-hectare assessment rationale

The 2005 Revegetation Plan used the habitat-hectare assessment methodology, outlined in Parkes *et al* (2003), which required that the precautionary principle be applied when assessing sites outside of the autumn/spring flowering season. Therefore all of the Habitat Zone polygons were presumed to contain plants of the Large Herb, Medium Herb and Small Herb life types. However, the current *Vegetation Quality Assessment Manual: Guidelines for applying the habitat hectares scoring method* (DSE 2004) states that it “supersedes all previous habitat hectare versions including that described by Parkes *et al* (2003)”. The precautionary principle has been slightly modified such that it now reads:

For the majority of understorey life forms, the observer should assess what is present at the time of the assessment, and not what may be present in the future or what may have been present in the past.

The presence and abundance of some life forms will be dependent on seasonal factors and life forms whose presence is largely dependent on ephemeral species are identified in the EVC benchmark

as a guide. In such cases, assessments conducted at a time of year when the life form would be expected to be present should assess the life form for its presence and degree of modification. Whereas, a precautionary principle could be applied when assessing the same site at a time of year when the life form would likely be absent. In such cases the assessor has the discretion to record the life form as ‘present’ and ‘unmodified’ after consideration of other threatening processes (e.g. weed invasion, grazing).

The key difference is that assessors are now allowed to take into consideration other factors other than season when applying the precautionary principle at their discretion, such as weed invasion. Under the original method (Parkes *et al* 2003), assessors were required to consistently assume a life form’s presence, thus “Where a benchmark includes annual or seasonal species/ life forms: if it is the wrong season for the life form to be present, take a precautionary approach and assume that the life form is present. Otherwise assess as usual”. While the current VQA Manual (DSE 2004) explicitly states that the assessor has the discretion to

record the life form as “present” and “unmodified”, it is implicitly saying that assessors now also have the option to record the life form as “absent”.

In the 2005 Revegetation Plan since “all of the Habitat Zone polygons [were] presumed to contain plants of the Large Herb, Medium Herb and Small Herb life types” each site’s understorey habitat-hectare score was given effectively an additional 10 points (i.e. sites scored 15 points of 25). This was due to having to assume the presence of a life form according to the precautionary principle outlined by Parkes *et al* 2003. The plan did note however that “The extensive cover of exotic herbaceous and grassy weed species ... makes it unlikely that these life types are present, or indeed, likely to regenerate without assistance.” It would be safe to assume therefore that the habitat-hectare scores of Habitat Zone 1–2, 4–6, 9–11 & 14–16 polygons would be 10 points lower than that indicated in Table 2 of the 2005 Plan. Therefore in this review, those Habitat Zones that were previously given the additional 10 points for understorey score have been adjusted downwards.

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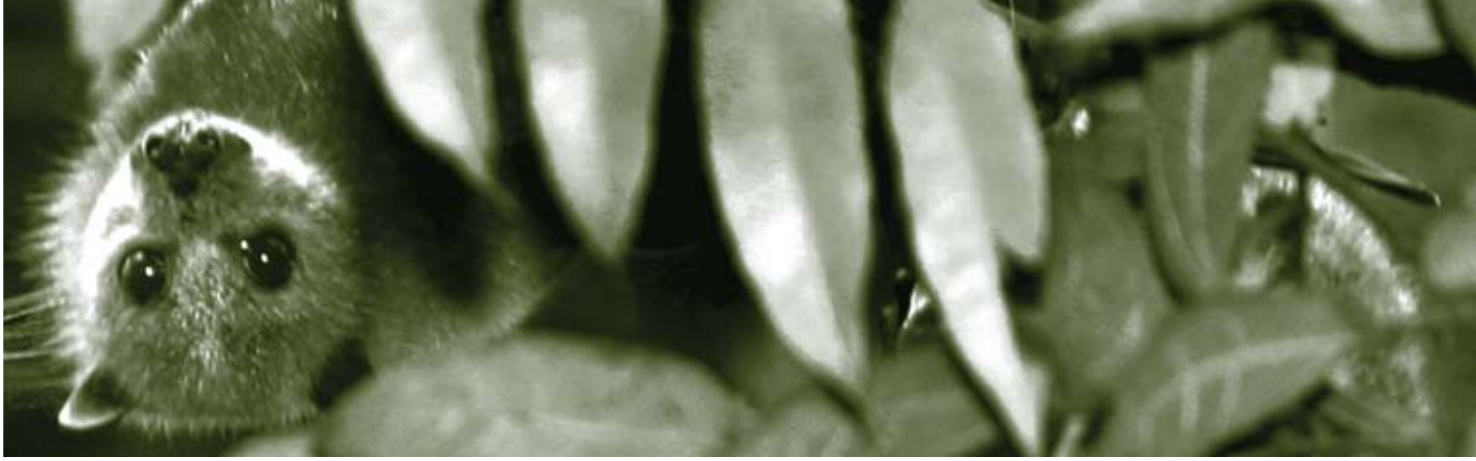
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Appendix 3

Condition changes in the 16 Habitat Zones

Habitat Zone No.	EVC	Comparing Changes in specific habitat elements							Habitat Score in 2005	Habitat Score in 2009	Change in Habitat Score
		Year	Canopy Cover	Understorey	Lack of weeds	Recruitment	Organic Litter	Logs			
1	Plains Grassy Woodland	2004	3	5	–	6	5	–	36	46	+10
		2009	3	10	–	6	5	5			
2	Floodplain Riparian Woodland	2004	5	5	–	6	3	2	45	62	+17
		2009	5	10	4	10	5	4			
3	Escarpment Shrubland	2004	4	5	–	–	2	–	27	(28/90) = 31 no LOT score	+4
		2009	5	5	–	5	2	–			
4	Plains Grassy Woodland	2004	4	5	–	6	3	–	41	60	+19
		2009	4	15	–	10	5	3			
5	Escarpment Shrubland	2004	5	5	4	6	5	–	44	(55/90) = 61	+17
		2009	4	15	4	10	5	3			
6	Floodplain Riparian Woodland	2004	1	5	–	10	3	3	42	35	+7
		2009	4	5	–	1	2	3			
7	Escarpment Shrubland	2004	4	15	4	10	5	5	63	(58/90) = 64	+10
		2009	5	15	4	10	5	5			
8	Plains Grassy Woodland and Box-Ironbark Forest	2004	3	5	–	3	–	–	28	31	+3
		2009	3	5	–	6	–	–			



General Condition in 2009	Comments and Improvements
This section is in good health. It does not contain any large old trees however and the understorey is not overly diverse.	
<p>The areas where works have been done have greatly improved. Some parts of the area in the north-east are unchanged from 2004. The section where revegetation hasn't occurred has a significant cover of introduced weeds.</p> <p>The section adjacent to Habitat Zone 4 and Habitat Zone 5 is also weedy.</p>	<p>From roughly the end of the river bend downstream to about Habitat Zone 4 there has been significant revegetation work and weed control undertaken.</p> <p>Natural recruitment has improved but is still limited. Litter and understorey have improved.</p>
Poor weed control after an initial broad-scale weed control effort. A weedy understorey occurs around the planted trees and shrubs.	Requires weed control around planted tubestock and guards and possibly infill planting with sturdy ground-storey tussocks
Significant work has occurred in this area with extensive understorey planting.	There has been a significant improvement since 2004. Continuing weed control and infill revegetation is required here to consolidate existing works.
The ground cover is in very good health.	Needs control of agave and tradescantia.
Canopy cover is poor where flying-foxes are roosting and the abundance of flying-foxes makes working difficult and they may be contributing to the significant amount of weeds.	<p>Urgent weed control may be appropriate.</p> <p>Review of wetland and future works may be needed.</p>
<p>Canopy cover is poor where flying-foxes are roosting and the abundance of flying-foxes makes working difficult.</p> <p>The other section of the canopy is in good health.</p>	<p>Weed control and revegetation required.</p> <p>Good choice of next spot for improving habitat values since it is close to the flying-fox colony and already has the "bones" of a good habitat structure.</p>
<p>General improvement in areas where slashing has been discontinued and where revegetation has been done.</p> <p>There has also been revegetation work done with indigenous ground-storey resulting in recruitment of ground-storey graminoids.</p>	<p>Stopped slashing some of this area resulting in understorey recruitment of pioneer species (silver wattle). Where this has occurred there are less grassy weeds and it will likely result in recruitment of ground-storey indigenous species.</p> <p>Control of mountain bike riding needed.</p>



Appendix 3

Condition changes in the 16 Habitat Zones continued

Habitat Zone No.	EVC	Comparing Changes in specific habitat elements							Habitat Score in 2005	Habitat Score in 2009	Change in Habitat Score
		Year	Canopy Cover	Understorey	Lack of weeds	Recruitment	Organic Litter	Logs			
9	Escarpment Shrubland	2004	5	5	–	6	3	5	43	(36/90) = 40	-3
		2009	4	5	–	3	5	5			
10	Floodplain Riparian Woodland	2004	4	5	–	10	5	5	52	53	+1
		2009	4	10	–	6	5	5			
11	Plains Grassy Woodland	2004	3	5	–	10	–	5	43	59	+16
		2009	4	15	4	6	5	5			
12	Box-Ironbark Forest	2004	5	15	–	3	3	3	53	68	+15
		2009	5	15	4	10	5	5			
13	Box-Ironbark Forest	2004	5	15	7	3	5	5	64	73	+9
		2009	5	15	13	6	5	5			
14	Escarpment Shrubland	2004	5	5	–	6	3	5	43	(53/90) = 59	+16
		2009	4	5	4	6	5	5			
15	Plains Grassy Woodland	2004	5	15	–	–	–	–	33	34 recent earthworks	+1
		2009	3	–	–	1	3	4			
16	Box-Ironbark Forest	2004	5	5	–	3	3	–	40	61	+21
		2009	4	15	6	5	5	2			
	Other areas	2004									+n
		2009									



General Condition in 2009	Comments and Improvements
Minimal weed cover. Recruitment of the understorey is occurring but is only moderate.	There is more recruitment of ground-storey which includes some planting. Revegetation of graminoids by the side of the path should be continued throughout the rest of the site.
Extensive revegetation has occurred transforming the area. Canopy health is roughly the same as in 2004. Understorey recruitment occurring to a moderate extent but could possibly be encouraged further.	The score does not fully reflect the site condition, partly because the recruitment score has decreased since 2004. This may be due to restoration work reducing opportunity for natural recruitment.
Aside from underneath the flying-fox roosting area and the wetland area the rest of the polygon is dominated by weeds. Central zone has poor canopy health where flying-foxes are roosting and works are difficult to implement.	Underneath flying-fox roosting sites: weed control done well and revegetation has taken well including trees 2.5m – 5m high. Wetland area is vastly improved on weeds, some recruitment of river red gums, good aquatic margin and logs introduced.
Little to no weeds overall. Some recruitment is occurring.	Erosion on the trail needs control. Perhaps the judicious introduction of ground-storey could be initiated.
Appears mostly unchanged despite increase in score. Virtually no weed cover.	Fence needs to be repaired.
Weed cover dramatically reduced.	Vast improvement on 2004. Control of a few woody weeds still required: boxthorn and peppercorn.
No change. Where earthworks have taken place the 2004 scores are not representative since the vegetation has been cleared to bare earth.	
Substantial revegetation work has enriched species diversity at the site. Litter has accumulated. Many major weeds have been eradicated.	Weed control should continue.
Dense eucalypt “thicket” like revegetation work done with juvenile trees up to 1m – 1.5 m in height in the area bounded by the freeway and Habitat Zones 1, 2 and 3. This area was previously un-vegetated and contains only a small amount of diversity. The slope area between Habitat Zones 3 and 4 also has had some significant revegetation work done.	

