

Eastern Creek Business Hub – VMP Implementation  
Progress Annual Report: Year 1 Jan – Dec 2021

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**Western Sydney Parklands Trust**

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Template 2.8.1

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**Abbreviations**

Abbreviation	Description
AW	Alluvial Woodland
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
CEEC	Critically Endangered Ecological Community
CPW	Cumberland Plain Woodland
ELA	Eco Logical Australia Pty Ltd
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
LGA	Local Government Area
OEMP	Operational Environmental Management Plan
RFEF	River-flat Eucalypt Forest
SPW	Shale Plains Woodland
VMP	Vegetation Management Plan
WSPT	Western Sydney Parklands Trust

# 1. Introduction

## 1.1 Context

Ecological Australia (ELA) has been engaged by the Western Sydney Parklands Trust (WSPT) to undertake the VMP annual progress report for the protection, restoration and rehabilitation of Cumberland Plain Woodlands and Shale-Gravel Transition Forest ecological community associated with the proposed development at Eastern Creek Retail Centre, Eastern Creek in the Blacktown Local Government Area (LGA).

ELA has also prepared the Vegetation Management Plan (VMP) for the site with the latest version released on 13 September 2018. This VMP (ELA 2018) provides the basis for vegetation management on the site as well as outlining the roles and responsibilities of WSPL and the Principal Contractor and has been accepted by Blacktown City Council.

Muru Mittigar has undertaken the VMP implementation works in Year 1. These works included site preparation, primary weed control works, photo point monitoring and quadrat data collection.

The objectives of the VMP are detailed in **Table 1**.

**Table 1: VMP objectives**

Objectives (environmental outcomes)	Approach
Improve ecological health and integrity	Control woody weeds and noxious weeds Revegetate with appropriate native species in keeping with the CPW ecological community Maintenance of weed control and gradual reduction to >40% of weed and exotic plant cover in 10 years Rectify poor drainage and hydrology to prevent further tree deaths Management of threats
Maintain and enhance habitat values	Protect existing native vegetation Weed control and gradual reduction to >10% of weed and exotic plant cover Increase native plant cover Management of threats
Stabilise creek bed and banks and maintain water quality	Minimise impacts of construction activities Ensure water quality is maintained Minimise the loss of native plant cover Utilise native vegetation planting to assist in stabilisation Management of threats

## 1.2 Site description

The VMP area, an area of 17.6 ha is largely flat and includes several remnant bushland areas, large open grasslands (**Figure 1**). The majority of the open grassland areas have been utilised for grazing purposes and are heavily disturbed resulting to the prevalence of exotic pasture grasses and herbaceous weeds.

Two native vegetation communities have been identified within the VMP area:

- Shale Plains Woodland (SPW), a component of Cumberland Plain Woodland (CPW)
- Alluvial Woodland (AW), a component of River-Flat Eucalyptus Forest (RFEF)

CPW is listed as a ‘Critically Endangered Ecological Community’ under both the NSW *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). RFEF is listed as an ‘Endangered Ecological Community’ under the BC Act.

The VMP site is bounded by M7 Motorway to the East, the Great Western Highway to the South, Rooty Hill Road South to the West and Church Street to the North.

The VMP divided the site into three management zones with a total VMP area of approximately 17.6 ha. The management zones area as follows:

- Zone 1: Regeneration (restoration) (5.2 ha)
- Zone 2: Revegetation (10.02 ha)
- Zone 3: Revegetation – wetlands (1.92 ha)

The project has been divided into an establishment period and a maintenance period. The establishment phase will run for three years, followed by a maintenance phase which will run for the following seven years.

ELA prepared a baseline Monitoring Report (ELA 2021) prior to works commencing on site to create a baseline for monitoring the vegetation for changes over the management period.

This report captures all the work undertaken in Year 1, covering the period from January – December 2021.

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Figure 1: VMP area

### 1.3 Performance Criteria

The aims of the VMP are to Improve ecological health and integrity, maintain and enhance habitat values, stabilise creek bed and banks and maintain water quality. The VMP covers the initial ten-year period, or until the objectives and performance criteria outlined in the VMP are met. The performance criteria required are provided in **Table 2** and **Table 3**.



**Table 2 Performance criteria – establishment**

Treatment Zones	Establishment		
	Year 1	Year 2	Year 3
All	<ul style="list-style-type: none"> <li>• Commencement or completion of all tasks outlined in the VMP (ELA 2018)</li> <li>• Management of priority weeds as per statutory regulations. No Blackberry patches over 4 m<sup>2</sup></li> <li>• Revegetation is to be undertaken with a minimum of 60% of the benchmark levels for species diversity provided in Appendix C of VMP (ELA 2018)</li> <li>• At one year post planting, a minimum of 80% survival rate of all vegetation strata planted in each zone (e.g. tree, shrub and groundcover)</li> <li>• Any localised plant failure within planting areas are addressed with no area larger than 2 m x 2 metres without surviving plants at one-year post planting;</li> <li>• Maintenance replanting is to replace plants with the same growth form (i.e. tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance or of provenance for climate change adaptation if required.</li> <li>• Monitoring and reporting undertaken in accordance with Section 7 of the VMP (ELA 2018)</li> </ul>		
	<ul style="list-style-type: none"> <li>• 100% initial treatment of woody and exotic weed species</li> <li>• Exotic ground covers 70% of original extent</li> <li>• Native vegetation cover no less than 40% of biometric benchmark</li> </ul>	<ul style="list-style-type: none"> <li>• Woody weeds and exotic vines to be less than 10% cover, not allowed to set seed and no establishment of new species</li> <li>• Exotic ground covers 65% of original extent</li> <li>• Native vegetation cover no less than 50% of biometric benchmark</li> </ul>	<ul style="list-style-type: none"> <li>• Woody weeds and exotic vines to be less than 5% cover, not allowed to set seed and no establishment of new species</li> <li>• Exotic ground covers 60% of original extent</li> <li>• Native vegetation cover no less than 60% of biometric benchmark</li> </ul>

**Table 3 Performance criteria – maintenance**

Treatment Zones	Maintenance			
	Year 4	Year 6	Year 8	Year 10
All	<ul style="list-style-type: none"> <li>• Commencement or completion of all tasks outlined in the VMP</li> <li>• Management of priority weeds as per statutory regulations. No Blackberry patches over 4 m<sup>2</sup></li> <li>• Revegetation is to be undertaken with a minimum of 60% of the benchmark levels for species diversity provided in Appendix C</li> <li>• At one year post planting, a minimum of 80% survival rate of all vegetation strata planted in each zone (e.g. tree, shrub and groundcover)</li> <li>• Any localised plant failure within planting areas are addressed with no area larger than 2 m x 2 metres without surviving plants at one year post planting;</li> <li>• Maintenance replanting is to replace plants with the same growth form (i.e. tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance or of provenance for climate change adaptation if required.</li> <li>• A demonstrated increase in native cover and diversity and a demonstrated decrease in exotic cover and diversity by the end of the maintenance period</li> <li>• Monitoring and reporting undertaken in accordance with Section 7 of the VMP (ELA 2018)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Woody weeds and exotic vines to be less than 2% cover, not allowed to set seed and no establishment of new species</li> <li>• Exotic ground covers 55% of original extent</li> <li>• Native vegetation cover no less than 65% of biometric benchmark</li> </ul>	<ul style="list-style-type: none"> <li>• Woody weeds and exotic vines to be less than 2% cover, not allowed to set seed and no establishment of new species</li> <li>• Exotic ground covers 50% of original extent</li> <li>• Native vegetation cover no less than 70% of biometric benchmark</li> </ul>	<ul style="list-style-type: none"> <li>• Woody weeds and exotic vines to be less than 2% cover, not allowed to set seed and no establishment of new species</li> <li>• Exotic ground covers 45% of original extent</li> <li>• Native vegetation cover no less than 75% of biometric benchmark</li> </ul>	<ul style="list-style-type: none"> <li>• No woody weeds or exotic vines present and no establishment of new species</li> <li>• Exotic ground covers 40% of original extent</li> <li>• Native vegetation cover no less than 80% of biometric benchmark</li> </ul>

**Table 4: Benchmark conditions for vegetation communities within the VMP areas**

PCT - ID	Vegetation Community	Species Richness			Cover* (%)		
		Canopy	Shrub	Groundcover#	Canopy	Shrub	Groundcover
PCT 849	Shale Plains Woodland	5	8	34	52	18	77
PCT 835	River-flat Eucalypt Forest	4	8	20	21	21	78

\* Based on monthly average following average rainfall year. Note: groundcovers include grasses and forbs but does not include ferns or other vegetation types within the groundstorey strata.

## 2. Preliminary works to be undertaken

### 2.1 Temporary fencing

According to Section 4.2.2 of the VMP (ELA 2018), temporary fencing is required to ensure construction activities do not impact onto conservation areas. Temporary construction fencing is to adhere to *AS4970 – 2009 Protection of trees on development sites*. Temporary fencing to be comprised of temporary stakes and high visibility orange ‘para webbing’ or similar to clearly identify the boundary between construction activities and vegetation management works and around trees to be retained in the construction area. The aim of this is to prevent any damage to native vegetation in the VMP area from construction activities and excludes all construction machinery, activities, materials and staff from the VMP area. The developer will also be responsible for the removal of all construction fencing after construction works are completed.

Temporary fencing has been installed along the south-western corner of the site adjacent to the construction site. There is currently no construction works being undertaken adjacent to any other part of the site therefore, there is no temporary fencing installed

### 2.2 Permanent fencing and signage

According to Section 4.2.2 of the VMP (ELA 2018), permanent fencing is to be installed once construction finishes. The purpose of this fence is to stop illegal access and dumping from occurring in the VMP area. Fencing of internal zones such as the gas easement will not be required. Perimeter fencing will allow access for WSPT parkland manager and sub-contractors and emergency vehicles only. The fencing style will at a minimum consist of rural style fencing and gates, consisting of treated timber posts set into concrete flooring and star picket posts with 3 or 4 strands of galvanised wire running between as indicated in the WSP Design Manual. Signage will state that the VMP areas are restricted access and only authorised personnel are permitted entry.

All fencing will be monitored and maintained as required to ensure it controls access to vehicles, grazing animals and the general public. Monitoring would occur when the VMP is being implemented. Broken fence palings, wires or holes in the fence that would allow unauthorised persons into the VMP area would require maintenance.

Permanent fencing has been installed along the road verge of Management Zones 1b and 1d where construction works have been completed. The remainder of the site is secure at the road boundaries and as such, the VMP site is secure from unauthorised access.

### 2.3 Sediment and erosion control

According to Section 4.2.3 of the VMP, sediment and erosion control will be implemented as per the CMP (J. Wyndham Prince 2012), the OEMP (ELA 2016) and as per the Managing Urban Stormwater – Soils and Construction Volume 1 2004 (Landcom) ‘The Blue Book’.

There is currently no construction works being undertaken on site there is no sediment and erosion control installed.

## 2.4 Seed collection

No seed was collected from site throughout Year 1

## 2.5 Habitat enhancement

No mulch or timber has been retained or kept on site

### 3. Vegetation management works to be undertaken

As identified in the VMP, management works are expected to be implemented over a period of ten years. Two work phases have been identified, including:

- Establishment (Years 1 – 3)
- Maintenance (Years 4 – 10)

#### 3.1 Management zones

Three vegetation management zones have been identified based upon works required (**Figure 2**)

- Zone 1: Regeneration (restoration)
- Zone 2: Revegetation
- Zone 3: Revegetation – wetlands

##### 3.1.1 Zone 1: Regeneration (restoration)

Zone 1, an area of 5.2 ha comprises all the remaining bushland remnants within the VMP area, to be regenerated to RFEF and CPW ecological communities.

##### 3.1.2 Zone 2: Revegetation

Zone 2, an area of 10.02 ha comprises the areas of site that will require revegetation, including proposed batters, the gas line easement and areas currently dominated by pasture grass, with few native shrubs or trees present.

##### 3.1.3 Zone 3: Revegetation – wetlands

Zone 3, an area of 1.92 ha comprises the area to be constructed and revegetated to native wetland including the channel base within constructed creek swales and the base of the OSD (onsite stormwater detention) / Bioretention basins.

#### 3.2 Revegetation

According to the VMP (ELA 2018), revegetation is to be undertaken across Management Zones 2 and 3 in Year 2. The need for revegetation in Management Zone 1 will be assessed at the end of Year 3. All revegetation is to be undertaken utilising species from the appropriate vegetation community as shown in Appendix C of the VMP (ELA 2018).

No revegetation works were undertaken in Year 1. Revegetation in Management Zones 2 and 3 will be undertaken in Year 2.

##### 3.2.1 Zone 1: Regeneration (restoration)

Management Zone 1 may require in-fill and buffer planting after initial weed control works have been undertaken. This will be assessed at the end of Year 3.

##### 3.2.2 Zone 2: Revegetation

According to Section 5.2 of the VMP (ELA 2018), revegetation in Management Zone 2 may be undertaken by either:

- Direct seeding with an integrated mulch matrix product
- Tubestock planting of trees, shrubs and groundcovers
- Tubestock planting of tree and shrubs only

This last approach may be undertaken to shade out exotic pasture species and change the habitat to promote native groundcover regeneration. This is a longer-term strategy (i.e. 10 years) and also assumes that there is sufficient native seed present in the soil profile to respond to the changing conditions. Allowance will be made for supplementing native seed if this is not the case. If sufficient native seed is not present in the soil profile to meet the performance criteria, planting may need to be supplemented by tubestock planting and/or introduction of native seed from commercial sources.

Site preparation will be required prior to revegetation works being undertaken. This includes:

- Scraping the top 100 mm of soils and pasture grasses for direct seeding
- Scraping or spraying all weeds and installing mulch to a depth of 100mm for tubestock installation of trees, shrubs and groundcovers.
- Slashing and spraying pasture grasses for tubestock installation of trees and shrubs.

### 3.2.3 Zone 3: Revegetation – wetlands

Management Zone 3 will require native sedges and rushes to be installed across the entire zone to resemble freshwater wetlands.

Site preparation works are to include the installation of jute matt in swales and areas of high erosion potential. No jute matt is to be installed within the bio retention basins as it interferes with filtration. At this stage, the northern basin is connected to the stage 1 development and is operational. The southern basin is due to be connected by 30 April 2020 to coincide with the practical completion of the stage 2 development.

## 3.3 Weed control

According to the Section 5.1.3 of the VMP (ELA 2018) , the site currently retains approximately eight noxious weed species, along with a further 31 exotic species known to occur on site at time of survey.

Primary weed control will include the treatment of the majority of noxious weeds, in particular *Lantana camara* (Lantana), *Rubus fruticosus* spp. *aggregate* (Blackberry) and *Cortaderia selloana* (Pampas Grass) were recorded in the exotic pasture zones, while one species *Lycium ferocissimum* (African Boxthorn) was recorded in the patch of Alluvial Woodland in the middle of the site.

Management Zone 2 is mostly comprised of pasture grasses and will require slashing and spraying in conjunction with the revegetation strategy that is undertaken.

Secondary weed control will focus on the regrowth of species treated throughout the primary weed control period. Maintenance weed control will then be undertaken for the remainder of the ten-year period to control weed regrowth from soil seed bank.

Primary weed control was undertaken on site throughout Year 1 which focused on the removal of mature woody weeds and vines.

### Woody weeds

Woody weeds were treated using the cut and paint method. Some adult specimens have been treated across the site however there is still more to go, in particular *Erythrina crista-galli* (Coral Tree) along the creekline.

### Vines

Each vine was skirted and sprayed with a selective herbicide once on the ground, where they were piled around the base of native trees to help minimise the amount of vine in the canopy and shrub layer. There was evidence of *Cardiospermum halicacabum* (Balloon Vine) still on site so more vine work is required to meet the relevant performance criteria.

A cumulative list of the main weeds treated since the beginning of the implementation phase is provided in **Table 5**.

**Table 5: Weed treatment table**

Species	Common Name
<i>Anredera cordifolia</i>	Madeira Vine
<i>Lantana camara</i> *	Lantana
<i>Ligustrum lucidum</i>	Broad-leaf Privet
<i>Ligustrum sinense</i>	Small-leaf Privet
<i>Lycium ferocissimum</i> *	African Boxthorn
<i>Olea europaea subsp. cuspidata</i>	African Olive
<i>Rosa filipes</i>	Scrambling Rose
<i>Rubus fruticosus sp. aggregate</i>	Blackberry

### 3.4 Monitoring requirements

Section 7 of the VMP (ELA 2018) specifies that monitoring will be undertaken prior to works being commenced to establish a benchmark for performance. This is to include the establishment of photo points and vegetation survey quadrats. Progress reports will then be prepared on an annual basis throughout the establishment period (Years 1 – 3) and bi-annually until the VMP is fully implemented (Years 4 – 10).



Figure 2: Vegetation management zones



## 4. Monitoring methods

### 4.1 Photo points

A total of **eight** photo points were established across all Management Zones prior to the commencement of vegetation management works on the 12 February 2021, by ELA Restoration Ecologist Andrew Norvill and Muru Mittigar Technical Manager Tim Withers.

Photos were taken from the SW corner of each monitoring quadrat. Comparative photos were taken from the same locations by Muru Mittigar Technical Manager Tim Withers on 29 October 2021.

The distribution of photo points / vegetation quadrats is detailed in **Table 6** and mapped in **Figure 2**. PCT849 relates to quadrats SP1, SP3, SP4, SP6 and SP8. PCT 835 relates to quadrat SP2, SP5 and SP8.

**Table 6: Quadrat and photo point locations**

Management Zone	Number of Quadrats	Quadrat names	PCT Zone
Zone 1 – Regeneration (restoration)	4	SP1	849
		SP3	849
		SP5	835
		SP6	849
Zone 2 – Revegetation	2	SP4	849
		SP8	849
Zone 3 – Revegetation (wetlands)	2	SP2	835
		SP7	835
<b>Total</b>	<b>8</b>	-	

### 4.2 Vegetation quadrats

Vegetation monitoring quadrats were established at the same location as the photo points.

A total of **eight**, 20 m x 20 m quadrats were established at the locations shown in **Figure 2**.

Each quadrat was marked with the GPS and has been identified onsite with star pickets installed in the South West corner of the quadrat.

The quadrat monitoring data was collecting by Muru Mittigar Team Leader Wayne Williams on 27 January 2022.

## 5. Monitoring results

### 5.1 Photo point results

Baseline photos and Year 1 comparison photos for each photo point have been included as **Appendix A**.

### 5.2 Vegetation monitoring results

This section provides the baseline floristic data for the site. The monitoring found:

#### Species richness (**Figure 3**)

- A slight increase in native species within the quadrats from 36 in March 2021, to 37 in February 2022
- No change in exotic species within the quadrats with 41 in both March 2021 and February 2022.

**Table 7: Baseline species richness comparison against species richness benchmark**

PT	Vegetation Community	Species richness benchmark			Year 1 species richness		
		Canopy	Shrub	Ground Cover	Canopy	Shrub	Ground Cover
849	Shale Plains Woodland	5	8	34	2	3	18
835	River-flat Eucalypt Forest	4	8	20	2	5	21

Native species diversity should increase once revegetation works have been undertaken in Year 2.

#### Mean ground layer cover abundance (**Figure 4,**)

- The mean ground layer cover abundance for all management zone was
  - An increase in native ground layer abundance from 11% in March 2021, to 15% in February 2022
  - An increase in exotic ground layer abundance from 53% in March 2021, to 62% in February 2022

Table 8 below contains a breakdown of the exotic ground layer recorded on site for each management zone in that respective reporting period measured against the maximum exotic groundcover allowed for that year. The data collected each year will be compared to the original extent recorded during the baseline data collection.

**Table 8: Maximum extent of exotic ground layer allowed each year**

Management Zone	Baseline	Year 1 (70%)	Year 2 (65%)	Year 3 (60%)	Year 4 (55%)	Year 6 (50%)	Year 8 (45%)	Year 10 (40%)
Zone 1: Maximum exotic ground layer required	N/A	15.6	14.5	13.4	12.3	11.2	10	8.9
<b>Zone 1: actual groundcover abundance</b>	<b>22.3</b>	<b>42.3</b>						

Management Zone	Baseline	Year 1 (70%)	Year 2 (65%)	Year 3 (60%)	Year 4 (55%)	Year 6 (50%)	Year 8 (45%)	Year 10 (40%)
Zone 2: Maximum exotic ground layer required	N/A	49	45.5	42	38.5	35	31.5	28
<b>Zone 2: actual groundcover abundance</b>	<b>70</b>	<b>71.5</b>						
Zone 3: Maximum exotic ground layer required	N/A	31.5	29.3	27	24.8	22.5	20.3	18
<b>Zone 3: actual groundcover abundance</b>	<b>45</b>	<b>62.5</b>						
<i>Overall Maximum exotic ground layer required</i>	<i>N/A</i>	<i>36.8</i>	<i>34.2</i>	<i>31.6</i>	<i>28.9</i>	<i>26.3</i>	<i>23.7</i>	<i>21</i>
<b>Overall actual groundcover abundance</b>	<b>52.6</b>	<b>61.9</b>						

Zones 1 and 3 in particular have seen a sharp increase in exotic vegetation (20% and 17.5% respectively). Zone 3 will have civil works undertaken prior to planting so there is little point in undertaking much in the way of regeneration works there however Zone 1 is the area that has the most resilience yet has seen the largest increase in exotic groundcover. If exotic groundcover were to remain high within Zone 1 after Year 2, it is likely that revegetation would be required once the Zone is assessed in Year 3. Overall, further exotic groundcover weed control is required across all zones if the site is to get back on track.

The data provided in **Table 9** contains groundcover abundance for each PCT recorded on site in that respective reporting period measured against the minimum biometric benchmark required for each PCT identified on site.

**Table 9: Performance against PCT native groundcover % benchmark**

PCT	Baseline	Year 1 (40%)	Year 2 (50%)	Year 3 (60%)	Year 4 (65%)	Year 6 (70%)	Year 8 (75%)	Year 10 (80%)
PCT – 849 minimum required	N/A	30.8	38.5	46.2	50	53.9	57.8	61.6
<b>PCT – 849 groundcover abundance</b>	<b>9.7</b>	<b>13.9</b>						
PCT – 835 minimum required	N/A	31.2	39	46.8	50.7	54.6	58.5	62.4
<b>PCT – 835 groundcover abundance</b>	<b>10.9</b>	<b>12.5</b>						

Groundcover abundance is significantly lower in both PCT’s across the site however this should increase once revegetation works and additional weed control works are undertaken in Year 2.

All monitoring data collected from Muru Mittigar is provided in **Appendix A**.

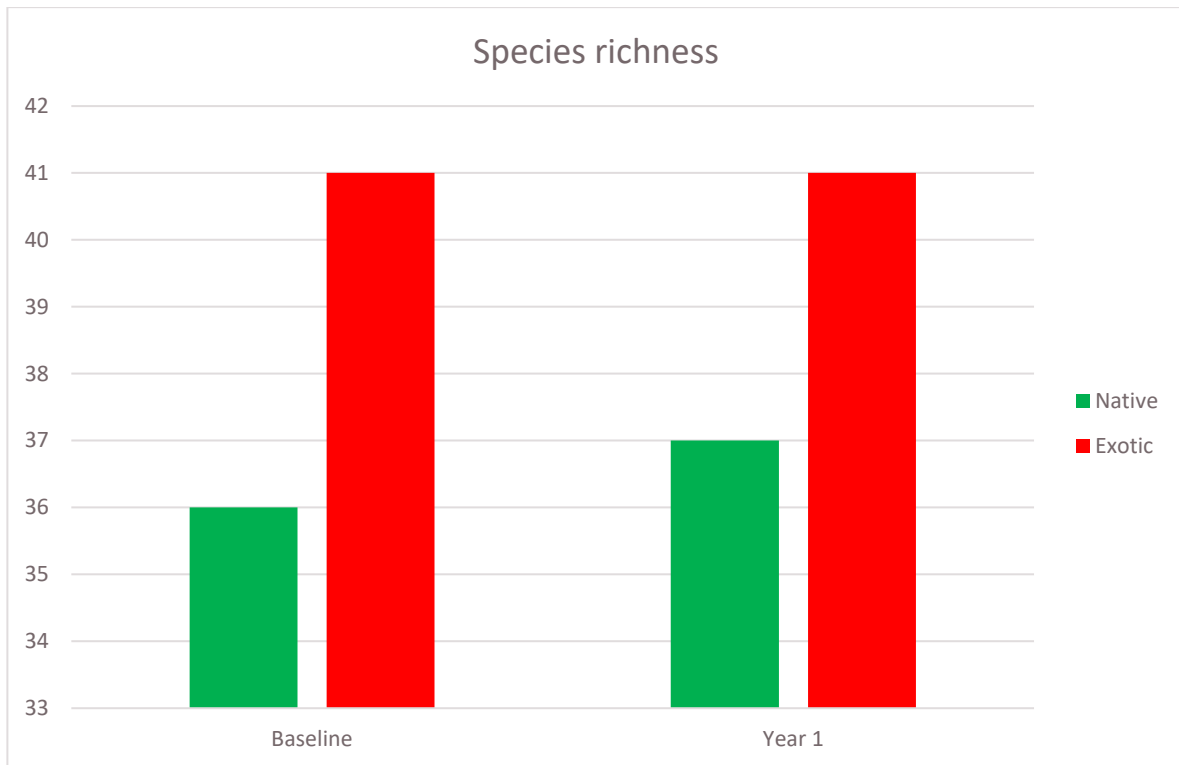


Figure 3: Species richness across all quadrats

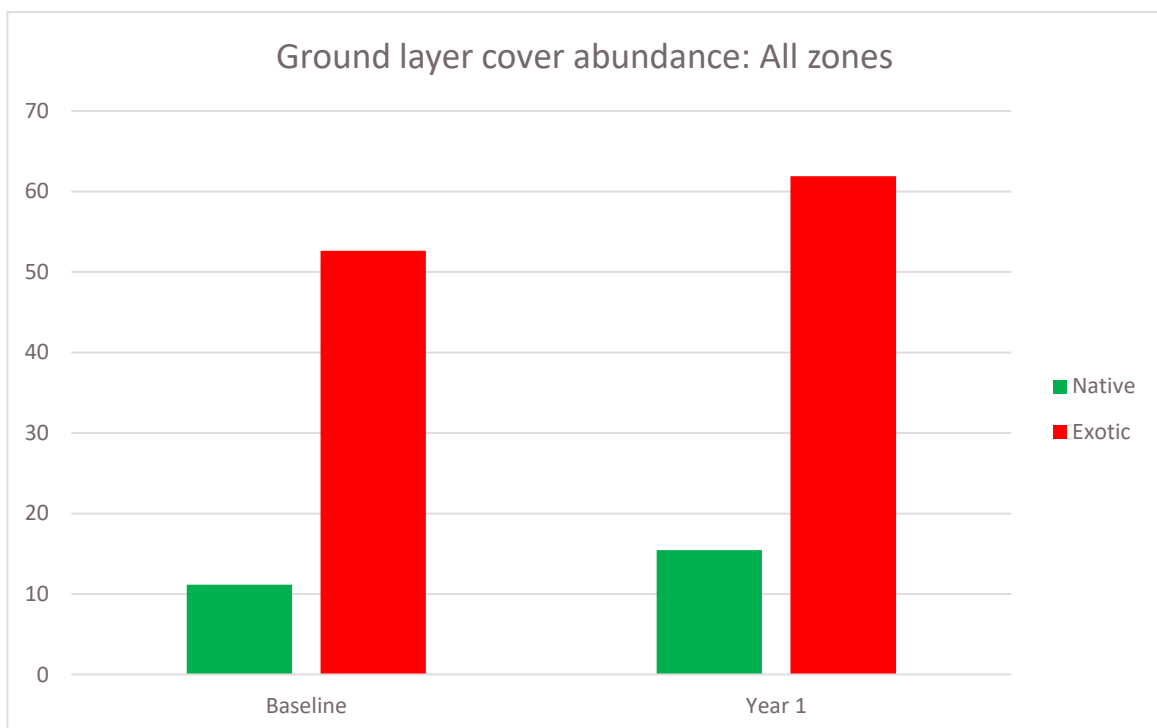


Figure 4: Mean ground layer cover abundance – All zones

## 6. Assessment against the performance criteria

Works concentrated on the removal of woody weeds and vines however approximately 50% of original woody weeds remain intact, mostly mature *Erythrina crista-galli* (Coral Trees) along the creekline. No treatment of exotic groundcover were undertaken given the level of exotic groundcover increased since the baseline monitoring data was recorded, in particular *Paspalum dilatatum* (Paspalum), *Setaria parviflora* (Pigeon Grass), *Verbena bonariensis* (Purple Top) and *Rubus fruticosus sp. aggregate* (Blackberry).

No revegetation works were undertaken in Year 1 as planting in Management Zones 2 and 3 are scheduled to be undertaken in Year 2.

COVID-19 however, severely impacted on the ability to undertake works within the VMP due to NSW Health orders as the site was located in COVID ‘hotspot’ and access was extremely limited for a period of four months. Overall, the performance criteria will be delayed in meeting targets through the life cycle of the VMP. Works programs will continue to aim for longer term target performance to catch up. Table 10 below shows each VMP performance target and whether the targets have been met.

**Table 10: Performance criteria – Year 1**

Performance criteria	Completed	Comment
Commencement or completion of all tasks outlined in the VMP	Yes	Revegetation for Zones 2 and 3 to be undertaken in Year 2. Zone 1 to be assessed in Year 3 to see if revegetation is required
Management of priority weeds as per statutory regulations. No Blackberry patches over 4 m <sup>2</sup>	Partial	Blackberry has been treated however there are still some patches larger than 4m <sup>2</sup> remaining.
Revegetation is to be undertaken with a minimum of 60% of the benchmark levels for species diversity provided in Appendix C	N/A	Revegetation for Zones 2 and 3 to be undertaken in Year 2. Zone 1 to be assessed in Year 3 to see if revegetation is required
At one year post planting, a minimum of 80% survival rate of all vegetation strata planted in each zone (e.g. tree, shrub and groundcover)	N/A	-
Any localised plant failure within planting areas are addressed with no area larger than 2 m x 2 m without surviving plants at one year post planting;	N/A	-
Maintenance replanting is to replace plants with the same growth form (i.e. tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance or of provenance for climate change adaptation if required.	N/A	-
Monitoring and reporting undertaken in accordance with Section 7	Yes	Baseline report previously prepared (ELA 2021). This is the Year 1 annual report

Performance criteria	Completed	Comment
100% initial treatment of woody and exotic weed species.	No	Approximately 50% of woody weeds remain intact
Exotic ground covers 70% of original extent	No	70% of the original extent of exotic groundcover would be 37.1%. At the end of Year 1, exotic groundcover is 61.9% which is well above what it needs to be after Year 1
Native vegetation cover no less than 40% of biometric benchmark	No	-PCT849 40% of the biometric benchmark would be 30.8%. The PCT groundcover after Year 1 is 13.9%  PCT835 40% of the biometric benchmark would be 31.2%. The PCT groundcover after Year 1 is 12.5%

## 7. Site issues and future works

### 7.1 Site issues

The retention basins (Management Zone 3) require further earthworks prior to revegetation works being undertaken and there is currently no timeframe on when these works will occur. Until all earthworks in the retention basin have been completed, vegetation management works will be limited.

COVID-19 lock downs and restrictions caused severe and extensive delays to the implementation of the VMP from July to November 2021. The delays were communicated to the Department via email on 5 August 2021. DAWE responded in agreement to halting works due to COVID-19 and stated that works could be resumed when possible. Following the easing of restrictions, works on site recommenced.

### 7.2 Future works

Future works within the VMP area include:

- Undertake primary weed control in areas that were not completed in Year 1 due to limitations enforced by COVID-19. According to the VMP performance criteria (ELA2016), 100% of woody weeds were meant to be treated throughout Year 1 and only approximately 50% has been treated to date. *Erythrina crista-galli* (Coral Trees) and *Lantana camara* (Lantana) are to be the main woody weed target species.
- Exotic groundcover species were not targeted throughout Year 1 due to limitations enforced by COVID-19 which has resulted in an increase in exotic groundcover, especially in Zones 1 and 3. This should be a priority in Year 2 with target species including *Rubus fruticosus spp. aggregate*, (Blackberry) *Senecio madagascariensis* (Fireweed), *Hypericum perforatum* (St. Johns Wort), *Chloris gayana* (Rhodes Grass), *Eragrostis curvula* (African Love Grass) and *Paspalum dilatatum* (Paspalum).
- Undertake secondary and maintenance weed control across all Management Zones.
- Undertake all revegetation tasks outlined in the VMP across Management Zones 2 and 3. Management Zone 1 is to be assessed in Year 3 to determine if revegetation is required
- Continue to undertake photo point and vegetation quadrat monitoring annually
- Continue to produce annual reports, including photos showing the progress of works throughout the VMP

## References

Eco Logical Australia. 2016. *Eastern Creek Retail Centre, Operational Environmental Management Plan Creek*. Prepared for Western Sydney Parklands Trust

Eco Logical Australia 2018. *Eastern Creek Retail Centre Vegetation Management Plan*. Prepared for Western Sydney Parklands Trust

Eco Logical Australia 2021. *Eastern Creek Business Hub VMP Baseline Monitoring Report*. Prepared for Western Sydney Parklands Trust

J. Wyndham Prince. 2012. *Eastern Creek Construction Management Plan*. Prepared for Western Sydney Parklands Trust



## Appendix A Photo points – Baseline photos



**Figure A1: Photo point 1\_SP1 – Taken 4 March 2021**



**Figure A2: Photo point 1\_SP1 – Taken 18 October 2021**



**Figure A3: Photo Point 2\_SP2 – Taken 4 March 2021**



**Figure A4: Photo Point 2\_SP2 – Taken 18 October 2021**



**Figure A5: Photo Point 3\_SP3 – Taken 5 March 2021**



**Figure A6: Photo Point 3\_SP3 – Taken 18 October 2021**



**Figure A7: Photo Point 4\_SP4 – Taken 5 March 2021**



**Figure A8: Photo Point 4\_SP4 – Taken 18 October 2021**



**Figure A9: Photo Point 5\_SP5 – Taken 5 March 2021**



**Figure A10: Photo Point 5\_SP5 – Taken 18 October 2021**



**Figure A11: Photo Point 6\_SP6 – Taken 5 March 2021**



**Figure A12: Photo Point 6\_SP6 – Taken 18 October 2021**



**Figure A13: Photo Point 7\_SP7 – Taken 7 March 2021**



**Figure A14: Photo Point 7\_SP7 – Taken 18 October 2021**





**Figure A15: Photo Point 8\_SP8 – Taken 7 March 2021**



**Figure A16: Photo Point 8\_SP8 – Taken 18 October 2021**

## Appendix B Vegetation monitoring data

### Native vegetation (March 2021)

Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Acacia falcata</i>						<1			0
<i>Angophora subvelutina</i>						<1			0
<i>Aristida vagans</i>	<1					<1			0
<i>Asperula conferta</i>	<1								0
<i>Brunoniella australis</i>	<1		<1			<1			0
<i>Bursaria spinosa</i>	<1		<1		<1				0
<i>Centella asiatica</i>	<1							<1	0
<i>Cheilanthes sieberi</i>					<1	<1			0
<i>Chloris truncata</i>		<1		<1					0
<i>Chloris ventricosa</i>			<1						0
<i>Commelina cyanea</i>			<1	<1	<1	<1			0
<i>Cyperus gracilis</i>					<1	<1			0
<i>Daviesia ulicifolia</i>						<1			0
<i>Dianella longifolia</i>			<1						0
<i>Dichondra repens</i>	<1		2			<1			0
<i>Digitaria parviflora</i>					<1				0
<i>Einadia nutans</i>			<1			<1			0
<i>Entolasia marginata</i>					<1				0
<i>Eragrostis leptostachya</i>			<1	<1	<1	<1			0

Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Eriochloa pseudoacrotricha</i>	<1								0
<i>Eucalyptus moluccana</i>	17		1		3	<1			2
<i>Eucalyptus tereticornis</i>	<1		16	<1	20	11			5
<i>Euchiton sphaericus</i>	<1	<1					<1		0
<i>Glycine tabacina</i>	<1		<1		<1	<1			0
<i>Jacksonia scoparia</i>					<1				0
<i>Juncus usitatus</i>		<1			<1		5		1
<i>Lachnagrostis filiformis</i>		<1					<1		0
<i>Microlaena stipoides</i>	<1		30	<1	35	35		10	12
<i>Oxalis perennans</i>				<1					0
<i>Paspalidium distans</i>	<1		<1		<1	<1			0
<i>Persicaria decipiens</i>		<1					<1		0
<i>Rytidosperma sp.</i>		<1				<1			0
<i>Sporobolus creber</i>	<1			<1	<1	<1			0
<i>Themeda triandra</i>	<1				<1	<1			0
<i>Wahlenbergia gracilis</i>				<1		<1			0
<b>Total cover</b>	<b>19</b>	<b>0</b>	<b>50</b>	<b>0</b>	<b>64</b>	<b>48</b>	<b>5</b>	<b>10</b>	<b>25</b>
<b>Total species</b>	<b>15</b>	<b>6</b>	<b>13</b>	<b>8</b>	<b>16</b>	<b>20</b>	<b>4</b>	<b>2</b>	<b>36</b>

## Exotic Vegetation (March 2021)

Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Araujia sericifera</i>	<1		<1		<1	<1			0
<i>Asparagus asparagoides</i>			<1		10	2			1
<i>Asparagus plumosus</i>	<1		<1	<1	<1	<1		<1	0
<i>Axonopus fissifolius</i>								<1	0
<i>Bidens Pilosa</i>	<1			<1	<1		<1		0
<i>Bidens sp.</i>			15		<1				2
<i>Briza subaristata</i>				<1	<1			<1	0
<i>Bromus catharticus</i>			<1						0
<i>Cenchrus clandestinum</i>		<1					<1		0
<i>Cirsium vulgare</i>	<1	<1			<1	<1		<1	0
<i>Conyza sp.</i>	<1	<1		<1	<1	<1	<1	<1	0
<i>Cycloperum leptophyllum</i>							<1		0
<i>Cynodon dactylon</i>	10	<1	<1	70	<1	<1		30	12
<i>Cyperus eragrostis</i>		5		<1			<1		1
<i>Digitaria sanguinalis</i>							<1		0
<i>Echinochloa colona</i>		<1							0
<i>Ehrharta erecta</i>			<1		<1	<1			0
<i>Eragrostis curvula</i>	<1			<1	<1				0
<i>Erythrina crista-galli</i>									0
<i>Gamochaeta sp.</i>		<1							0
<i>Hypericum perforatum</i>				5					1

Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Hypochaeris radicata</i>					<1	<1		<1	0
<i>Ligustrum lucidum</i>			<1		<1	<1			0
<i>Ligustrum sinense</i>			<1		<1				0
<i>Lycium ferocissimum</i>			5		<1				1
<i>Medicago polymorpha</i>							<1		0
<i>Modiola caroliniana</i>		<1					<1		0
<i>Olea europaea subsp. cuspidata</i>						<1			0
<i>Paspalum dilatatum</i>	25	10	<1	15	<1	<1	<1	20	8
<i>Plantago lanceolata</i>	<1	<1		<1			<1		0
<i>Polygonum aviculare</i>		<1					<1		0
<i>Rumex crispus</i>		<1		<1			<1		0
<i>Senecio madagascariensis</i>	<1	<1	<1	<1	<1	<1	<1	<1	0
<i>Setaria parviflora</i>	20	<1	<1	<1	<1	<1	<1	<1	2
<i>Sida rhombifolia</i>	<1				5	2			1
<i>Solanum linnaeanum</i>	<1				<1	<1	<1		0
<i>Solanum nigrum</i>	<1				<1	<1			0
<i>Solanum pseudocapsicum</i>			<1		<1	<1			0
<i>Symphytotrichum subulatum</i>	<1	<1		<1			<1	<1	0
<i>Trifolium sp.</i>		<1					15		2
<i>Verbena bonariensis</i>	<1	20		<1			40	<1	7
<i>Verbena rigida</i>								<1	0
<b>Total cover</b>	<b>55</b>	<b>35</b>	<b>21</b>	<b>90</b>	<b>15</b>	<b>4</b>	<b>55</b>	<b>50</b>	<b>55</b>
<b>Total species</b>	<b>16</b>	<b>17</b>	<b>14</b>	<b>15</b>	<b>22</b>	<b>17</b>	<b>18</b>	<b>13</b>	<b>41</b>

## Native vegetation (February 2022)

Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Acacia falcata</i>						<1			0
<i>Angophora subvelutina</i>						<1			0
<i>Aristida vagans</i>	<1					<1			0
<i>Asperula conferta</i>	<1								0
<i>Brunoniella australis</i>	<1		<1			<1			0
<i>Bursaria spinosa</i>	<1		<1		<1				0
<i>Centella asiatica</i>	<1							<1	0
<i>Cheilanthes sieberi</i>					<1	<1			0
<i>Chloris truncata</i>		<1		<1					0
<i>Chloris ventricosa</i>			<1						0
<i>Commelina cyanea</i>			<1	<1	<1	<1			0
<i>Cyperus gracilis</i>					<1	<1			0
<i>Daviesia ulicifolia</i>						<1			0
<i>Dianella longifolia</i>			<1						0
<i>Dichondra repens</i>	<1		5			<1			1
<i>Digitaria parviflora</i>					<1				0
<i>Einadia nutans</i>			<1			<1			0
<i>Entolasia marginata</i>					<1				0
<i>Eragrostis leptostachya</i>			<1	<1	<1	<1			0
<i>Eriochloa pseudoacrotricha</i>	<1								0
<i>Eucalyptus moluccana</i>	17		2		10	5			4

Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Eucalyptus tereticornis</i>	1		16	<1	20	11			5
<i>Euchiton sphaericus</i>	<1	<1					<1		0
<i>Glycine tabacina</i>	<1		<1		<1	<1			0
<i>Jacksonia scoparia</i>					<1				0
<i>Juncus usitatus</i>		<1			<1		10		1
<i>Lachnagrostis filiformis</i>		<1					<1		0
<i>Microlaena stipoides</i>	<1		35	<1	45	40		10	14
<i>Oxalis perennans</i>				<1					0
<i>Paspalidium distans</i>	<1		<1		<1	<1			0
<i>Persicaria decipiens</i>		<1					<1		0
<i>Rytidosperma sp.</i>		<1				<1			0
<i>Sporobolus creber</i>	<1			<1	<1	<1			0
<i>Themeda triandra</i>	<1				<1	<1			0
<i>Wahlenbergia gracilis</i>				<1		<1			0
<b>Total cover</b>	<b>32</b>	<b>4</b>	<b>61</b>	<b>5</b>	<b>76</b>	<b>63</b>	<b>5</b>	<b>10</b>	<b>45</b>
<b>Total species</b>	<b>15</b>	<b>6</b>	<b>13</b>	<b>8</b>	<b>16</b>	<b>20</b>	<b>4</b>	<b>2</b>	<b>37</b>

## Exotic Vegetation (February 2022)

Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Araujia sericifera</i>	<1		<1		<1	<1			0
<i>Asparagus asparagoides</i>			<1		10	10			2
<i>Asparagus plumosus</i>	<1		<1	<1	<1	<1		<1	0
<i>Axonopus fissifolius</i>								<1	0
<i>Bidens Pilosa</i>	<1			<1	<1		<1		0
<i>Bidens sp.</i>			10		<1				1
<i>Briza subaristata</i>				<1	<1			<1	0
<i>Bromus catharticus</i>			<1						0
<i>Cenchrus clandestinum</i>		<1					<1		0
<i>Cirsium vulgare</i>	<1	<1			<1	<1		<1	0
<i>Conyza sp.</i>	<1	<1		<1	<1	<1	<1	<1	0
<i>Cyclosporum leptophyllum</i>							<1		0
<i>Cynodon dactylon</i>	15	<1	<1	70	<1	<1		30	13
<i>Cyperus eragrostis</i>		10		<1			<1		1
<i>Digitaria sanguinalis</i>							<1		0
<i>Echinochloa colona</i>		<1							0
<i>Ehrharta erecta</i>			<1		<1	<1			0
<i>Eragrostis curvula</i>	<1			<1	<1				0
<i>Erythrina crista-galli</i>									0
<i>Gamochaeta sp.</i>		<1							0
<i>Hypericum perforatum</i>				10					1



Species	% Projected foliage cover in quadrats								% Total cover
	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	
<i>Hypochaeris radicata</i>					<1	<1		<1	0
<i>Ligustrum lucidum</i>			<1		<1	<1			0
<i>Ligustrum sinense</i>			<1		<1				0
<i>Lycium ferocissimum</i>			<1		<1				0
<i>Medicago polymorpha</i>							<1		0
<i>Modiola caroliniana</i>		<1					<1		0
<i>Olea europaea subsp. cuspidata</i>						<1			0
<i>Paspalum dilatatum</i>	30	20	<1	15	<1	<1	<1	15	9
<i>Plantago lanceolata</i>	<1	<1		<1			<1		0
<i>Polygonum aviculare</i>		<1					<1		0
<i>Rumex crispus</i>		<1		<1			<1		0
<i>Senecio madagascariensis</i>	<1	<1	<1	<1	<1	<1	<1	<1	0
<i>Setaria parviflora</i>	20	<1	<1	<1	<1	<1	<1	<1	2
<i>Sida rhombifolia</i>	<1				10	50			7
<i>Solanum linnaeanum</i>	<1				<1	<1	<1		0
<i>Solanum nigrum</i>	<1				<1	<1			0
<i>Solanum pseudocapsicum</i>			<1		<1	<1			0
<i>Symphytotrichum subulatum</i>	<1	<1		<1			<1	<1	0
<i>Trifolium sp.</i>		<1					20		2
<i>Verbena bonariensis</i>	<1	10		<1			20	<1	3
<i>Verbena rigida</i>								<1	0
<b>Total</b>	<b>87</b>	<b>70</b>	<b>26</b>	<b>93</b>	<b>26</b>	<b>30</b>	<b>55</b>	<b>50</b>	<b>62</b>
<b>Total species</b>	<b>16</b>	<b>17</b>	<b>14</b>	<b>15</b>	<b>22</b>	<b>17</b>	<b>18</b>	<b>13</b>	<b>41</b>

