



Metropolitan Coal Vegetation Monitoring

Longwalls 20-22 Spring 2019

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1 Introduction

Metropolitan Coal is located near Helensburgh, approximately 30 km south of Sydney and 30 km north of Wollongong (**Figure 1**). Metropolitan Coal is a wholly owned subsidiary of Peabody Energy Australia Pty Ltd.

Metropolitan Coal was granted approval (08_0149) for the Metropolitan Coal Project (the Project) in accordance with Section 75J of the *Environmental Planning and Assessment Act 1979* on 22 June 2009. In accordance with Project Approval Condition 6, Schedule 3, a Biodiversity Management Plan (BMP) has been prepared as a component of the Metropolitan Coal Longwalls 20-22 Extraction Plan to manage the potential environmental consequences of the Extraction Plan on aquatic and terrestrial flora and fauna, with a specific focus on swamps (Metropolitan Coal 2014).

The Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan has been superseded by the Metropolitan Coal Longwall 304 Biodiversity Management Plan (Metropolitan Coal 2019). In accordance with the Metropolitan Coal Longwall 304 Biodiversity Management Plan, the Longwalls 20-22 vegetation monitoring program has continued to be implemented to monitor the potential impacts of Longwalls 20 - 22 on terrestrial flora, with a specific focus on upland swamp and riparian vegetation.

Mining of Longwall 20 commenced in May 2010 and was completed in April 2014. This spring 2019 report presents the twelfth dataset collected post the completion of Longwalls 20-22, with data also collected in autumn and spring from 2014 to 2018 and autumn 2019 (Eco Logical Australia 2014a – 2020). Previous data collection and reporting has occurred during the mining of Longwalls 20-22 in spring 2010, autumn and spring 2011, autumn and spring 2012, and autumn and spring 2013 (Eco Logical Australia 2010b – 2013b). Prior to the commencement of mining, baseline data was collected during spring 2008, autumn and spring 2009 and autumn 2010 (Eco Logical Australia 2010a).

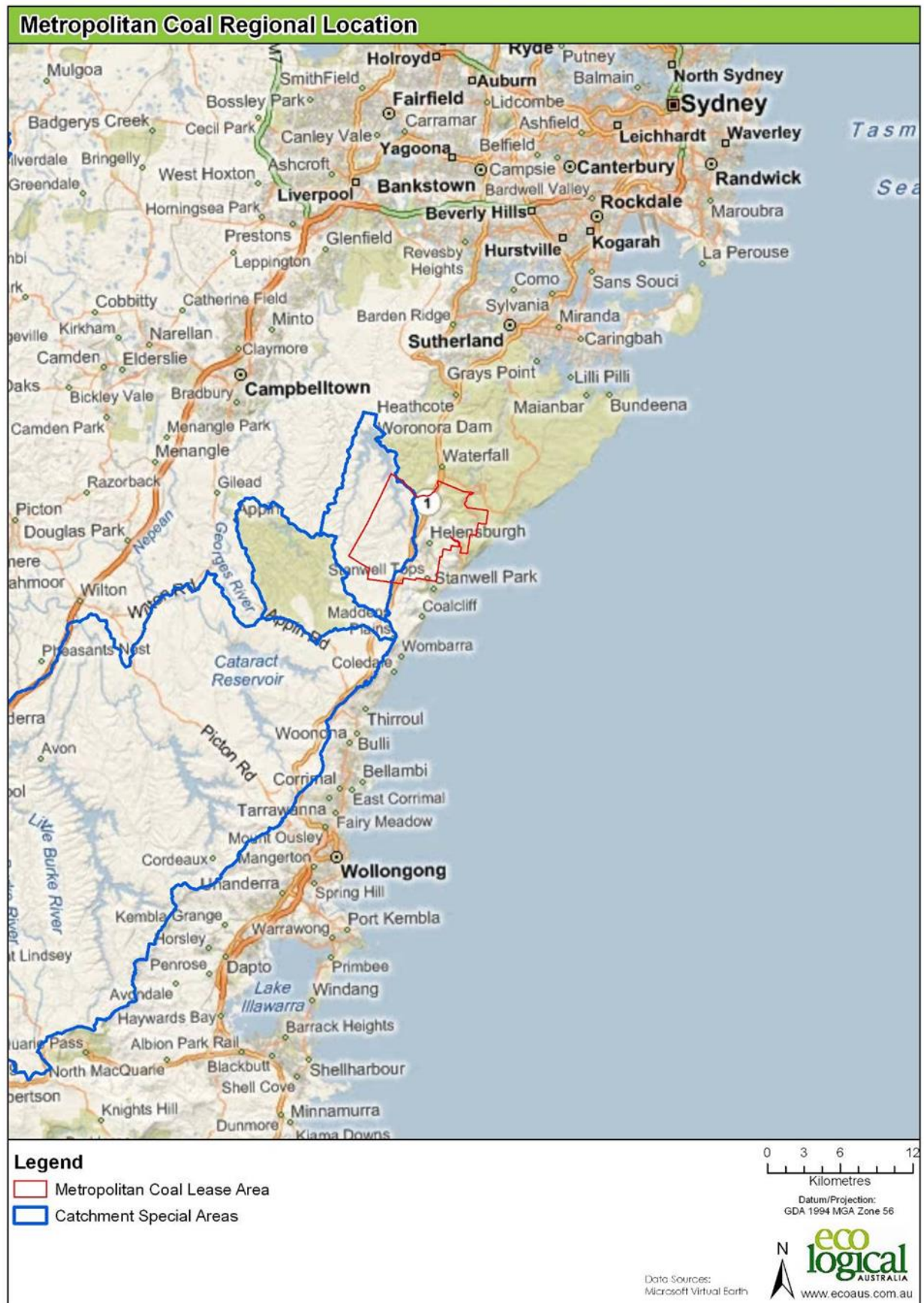


Figure 1: Metropolitan Coal regional location.

2 Methods

The vegetation monitoring program for Longwalls 20-22 comprises two main components:

- monitoring of upland swamp vegetation; and
- monitoring of riparian vegetation.

Bangalay Botanical Surveys (BBS 2008) mapped eight upland swamps located above or immediately adjacent to Longwalls 20-22 consistent with vegetation mapping by the NSW National Parks and Wildlife Service (NPWS 2003), namely Swamps 16, 17, 18, 20, 23, 24, 25 and 26 (**Figure 2** and **Figure 3**). The vegetation in all eight swamps was classified as 'Sedgeland-heath Complex' consistent with vegetation mapping by NPWS (2003). Sedgeland-heath Complex is a mapping unit that amalgamates the Sedgeland, Restioid Heath and Cyperoid Heath vegetation associations identified by Keith & Myerscough (1993) but amalgamated by NPWS (2003) on the basis that they could not be readily distinguished by air photo interpretation for community mapping (Metropolitan Coal 2014). With the exception of Swamp 20, which subsequent field inspections indicated supports Tea Tree Thicket, all the swamps over Longwalls 20-22 are small and comprise either Banksia Thicket, Restioid Heath, or a combination of the two.

Three of the vegetation patches mapped as swamps (Swamps 16, 17 and 23), although showing seepage, are doubtfully upland swamps, being more akin to Sandstone Heath Woodland with low tree densities (Metropolitan Coal, 2014). The vegetation on these patches has species found in upland swamps, mixed with a range of non-swamp species, including *Banksia serrata*, *Eucalyptus sieberi* and *E. racemosa* in Swamps 16 and 17, and *Angophora hispida* and *Allocasuarina littoralis* in the case of Swamp 23. However, Swamp 23 also has a number of characteristic swamp species, including *Sprengelia incarnata*, *Epacris obtusifolia* and *Pultenaea aristata*, indicating at least some parts of it are quite moist. However, despite this, Swamp 23 is considered to be transitional between swamp and wet heath and somewhat atypical (Metropolitan Coal 2014), and is therefore not included in the monitoring program.

Riparian vegetation occurs along streams which flow to the Woronora Reservoir including the Waratah Rivulet and the Eastern Tributary and some of their tributaries. Vegetation mapped by Bangalay Botanical Surveys (2008) is shown on **Figure 2**. Riparian vegetation includes vegetation mapped as community 4a (Sandstone Riparian Scrub; BBS 2008).

Upland swamp and riparian vegetation surveys are conducted bi-annually in autumn and spring.

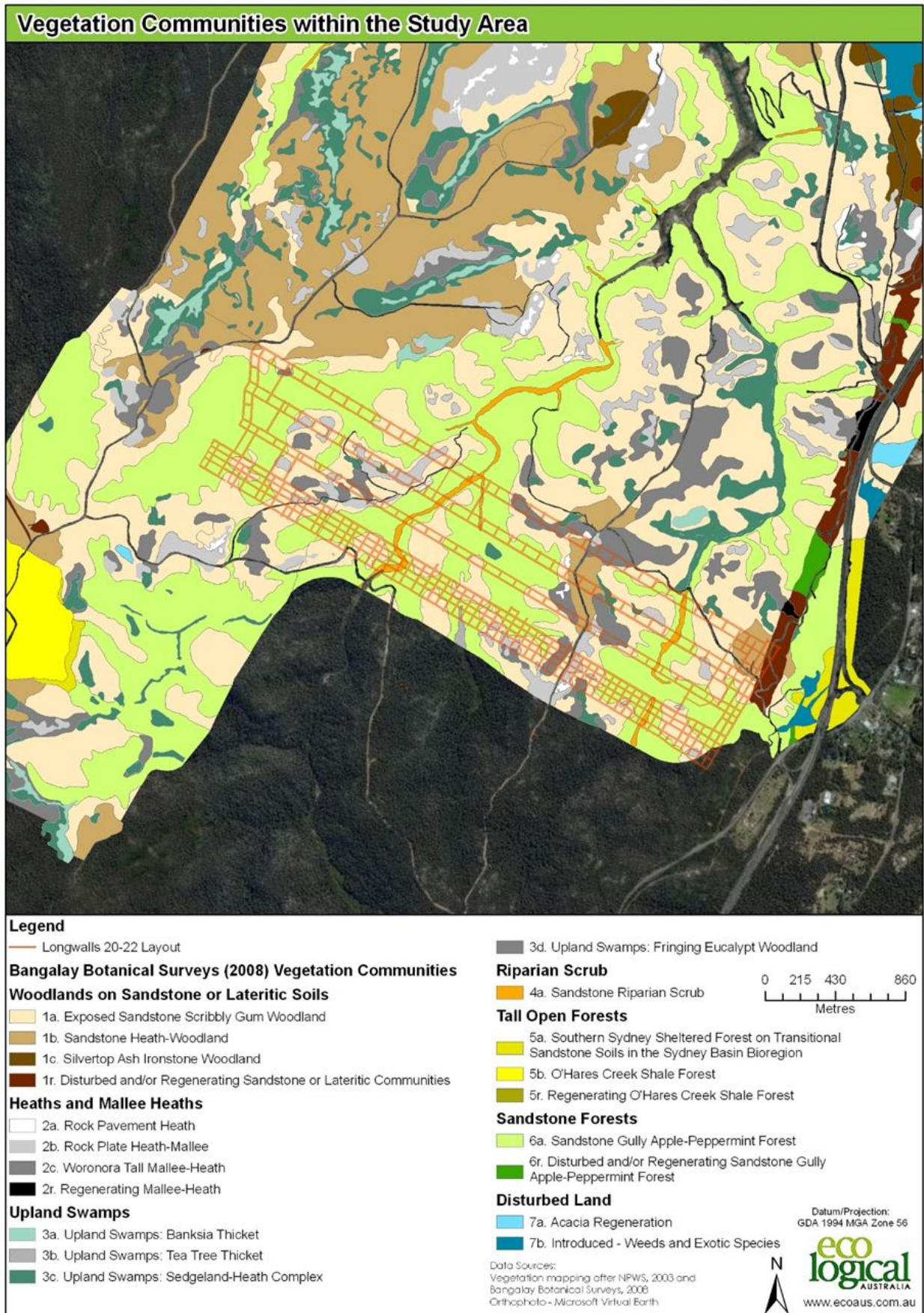


Figure 2: Vegetation communities overlying Longwalls 20 to 22 and surrounds.

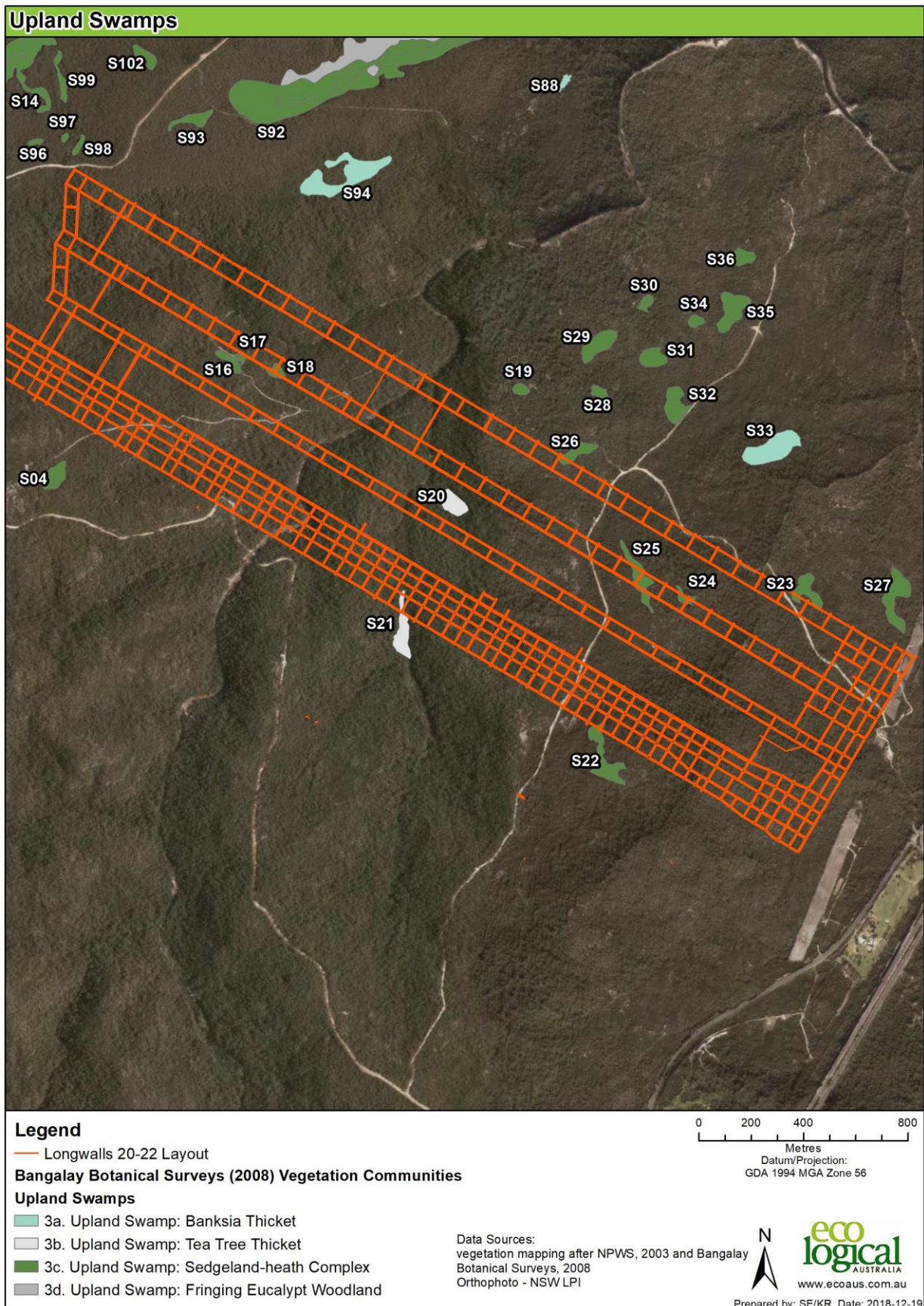


Figure 3: Upland swamps overlying and adjacent to Longwalls 20 to 22.

2.1 Upland swamp monitoring

2.1.1 Visual inspections

Visual inspections were conducted during spring 2019 in Swamps 16, 17, 18, 20, 24, and 25 overlying and/or immediately adjacent to Longwalls 20-22 (**Figure 3**) and control Swamps 101, 111a, 125, Woronora River 1, Woronora River south arm, and Dahlia Swamp, (**Figure 4**) to record evidence of potential subsidence impacts.

Traverses over the swamps were conducted in spring 2019 to record:

- cracking of exposed bedrock areas and/or swamp substrate;
- areas of increased erosion, particularly along any existing drainage line;
- any changes in water colour, particularly evidence of iron precipitation;
- changes in vegetation condition, including areas of stressed vegetation (i.e. plants that demonstrate symptoms of stress) and dead/dying plants that appear unusual; and
- whether the amount of seepage (at the terminal step/over exposed surfaces of the swamp) at the time of inspection appears unusual (relative to recent rainfall).

Photographs of any cracking, erosion, water colour changes and stressed vegetation were recorded, concurrently with a description of these observations, and appropriate global positioning system (GPS – GDA 94 datum) readings taken for established photo points and areas of interest. Seepage areas were documented by photographs of flow over exposed surfaces, e.g. terminal step and exposed sandstone areas.

Traverses aimed at covering the majority of the extent of each swamp were conducted.

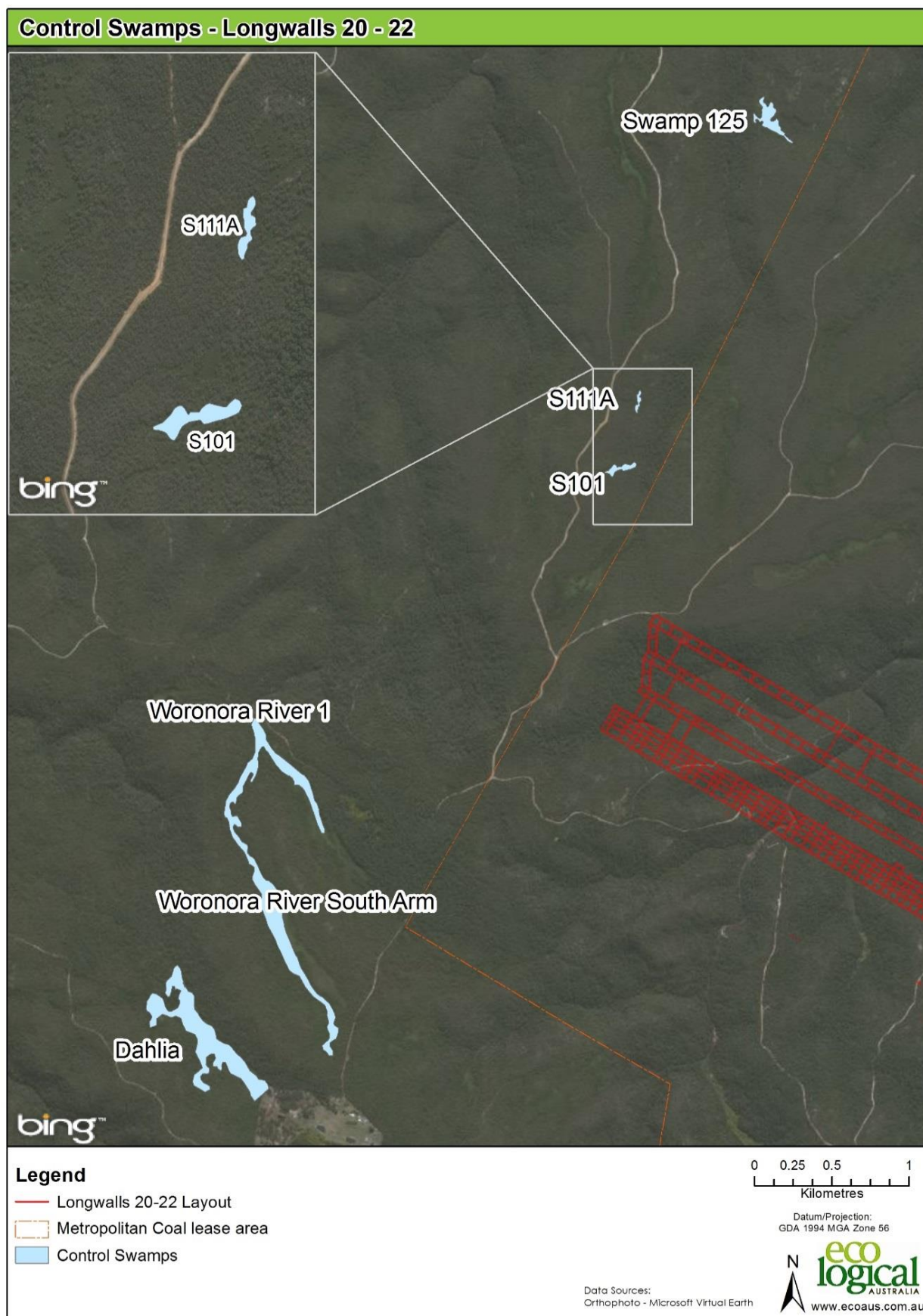


Figure 4: Control swamps in which vegetation monitoring is undertaken.

2.1.2 Transect/quadrat monitoring

Transect/quadrat monitoring was conducted during spring 2019 in Swamps 16, 17, 18, 20, 24, and 25 overlying or immediately adjacent to Longwalls 20-22 and in control Swamps 101, 111a, 125, Woronora River 1, Woronora River south arm, and Dahlia Swamp.

Swamps 16, 17, 18, 24, 25, and control Swamps 101, 111a and 125 are valley side swamps with Restioid Heath / Banksia Thicket and tend to have their longest axis extending horizontally around the slope, perpendicular to the gradient, and are often rather narrow (Metropolitan Coal 2014). Three transects have been established in each of these swamps extending downslope perpendicular to the horizontal long axis and approximately evenly distributed along the long axis.

Swamp 20 is a small in-valley swamp on a second order stream which supports Tea Tree Thicket. Swamp 20 is unique, in that no similar swamps in terms of their geomorphic characteristics are known or have been detected by extensive searches (Metropolitan Coal 2014). Patches of Tea Tree Thicket in three much larger swamps (Woronora River 1, Woronora River south arm and Dahlia Swamp) have been selected as controls for Swamp 20 with the proviso that the condition and floristics of the vegetation in all swamps is similar. Swamp 20 and the corresponding control swamps Woronora River 1, Woronora River south arm, and Dahlia Swamp have their long axis extending downslope. In these swamps transects have been established across the slope perpendicular to the long axis. Three approximately evenly spaced transects have been established in Swamp 20 above the terminal step. As the control swamps are much larger in area, only a single transect has been established in each at a location selected for its similarity to Swamp 20 vegetation.

Transects have been marked with a star picket at each end and at regular intervals (20 m) to ensure that the same transect is sampled each time. Vegetation has also been flagged along this transect (every 5 m) to further aid re-locating the transect line and quadrat positions. For the valley side swamps, vegetation assessment is made on 1 m² quadrats centred on the transect line at 5 m intervals starting from 0 m. For Swamp 20 and the associated control swamps, vegetation assessment is made on 1 m² quadrats placed upslope of the transect line with one quadrat edge located on the line. As these swamps are thickly vegetated, the effects of trampling within the quadrat, if located on the edge and upslope of the transect line, is avoided.

The transect length varies within each swamp and between swamps, however, the statistical analyses to be performed on the quadrat data do not require the transect lengths to be the same between swamps.

The data collected for each quadrat included:

- vegetation structure;
- dominant species;
- estimated cover and height for each stratum;
- full floristics;
- estimated cover/abundance for each species in the quadrat using the following seven-point Modified Braun-Blanquet scale:

Modified Braun-Blanquet Scale

- 1 = cover less than 5% of site and rare
- 2 = cover less than 5% of site and uncommon
- 3 = cover less than 5% of site and common
- 4 = cover 5% – 20% of site
- 5 = cover 21% – 50% of site
- 6 = cover 51% – 75% of site
- 7 = cover 76% – 100%

- condition/health rating for each species in the quadrat using the following scale:

Condition Scale

- 1 = severe damage/dieback
- 2 = many dead stems
- 3 = some dead branches
- 4 = minor damage
- 5 = healthy

Photographs of each quadrat and permanent photo points along each transect were taken.

2.1.3 Indicator species

Due to the minimal number of swamps and variation in floristics across the swamps, it has not been possible to select indicator species common to all swamps. Overall, six indicator species have been selected, three for the Restioid Heath / Banksia Thicket swamps and three for the Tea Tree Thicket swamps across both longwall and control sites. Twenty tagged individuals of each species are monitored as follows:

- Epacris obtusifolia* – monitored in Swamps 18, 24, 25, 101, 111a and 125;
- Sprengelia incarnata* – monitored in Swamps 24, 101 and 125;
- Pultenaea aristata* – monitored in Swamps 18, 24, 25, 101 and 111a;
- Banksia robur* – monitored in Swamp 20, Woronora River 1, Woronora River south arm, and Dahlia Swamp;
- Callistemon citrinus* – monitored in Swamp 20, Woronora River 1, Woronora River south arm, and Dahlia Swamp; and
- Leptospermum juniperinum* – monitored in Swamp 20, Woronora River 1, Woronora River south arm, and Dahlia Swamp.

Population monitoring data collected includes:

- condition/health rating for each plant, based on the following scale:

Condition Scale

- 1 = severe damage/dieback
- 2 = many dead stems
- 3 = some dead branches
- 4 = minor damage
- 5 = healthy

- reproductive rating for each plant, based on the following scale:

Reproductive Rating

- 1 = nil
- 2 = sparse (occasional flowers only)
- 3 = low (under 25% of potential flowering)
- 4 = moderate (25% to 75% of potential flowering)
- 5 = high (over 75% of potential flowering)

All locations of tagged individuals were recorded using a differential GPS providing sub-metre accuracy to enable accurate re-location during future surveys. Tagged individuals were also flagged in the upper branches providing a rapid visual reference point.

2.2 Riparian vegetation

Riparian vegetation is monitored along the Waratah Rivulet (longwall sites MRIP01 and MRIP02 and control sites MRIP03, MRIP04 and MRIP10) and the Eastern Tributary (longwall sites MRIP05, MRIP06, and MRIP09 and control (compromised) sites MRIP07 and MRIP08) (**Figure 5**).

Riparian vegetation monitoring sites MRIP07 and MRIP08 were used as control sites for comparison against the longwall riparian monitoring sites prior to subsidence impacts occurring to pools on the Eastern Tributary at these sites post spring 2016 and before autumn 2017. Analysis from autumn 2017 onwards no longer considers these sites as control sites.

2.2.1 Visual Inspections

Visual inspections of riparian areas were undertaken in locations adjacent to riparian vegetation monitoring sites (MRIP01 – MRIP10, **Figure 5**) together with areas traversed whilst accessing the monitoring sites to record evidence of subsidence impacts including:

- areas of new water ponding;
- any cracking or rock displacement; and
- changes in vegetation condition, including areas of stressed vegetation that appear unusual.

Photographs of any new water ponding, cracking/rock displacement and stressed vegetation were taken, concurrently with a description of the observations, and appropriate GPS readings.

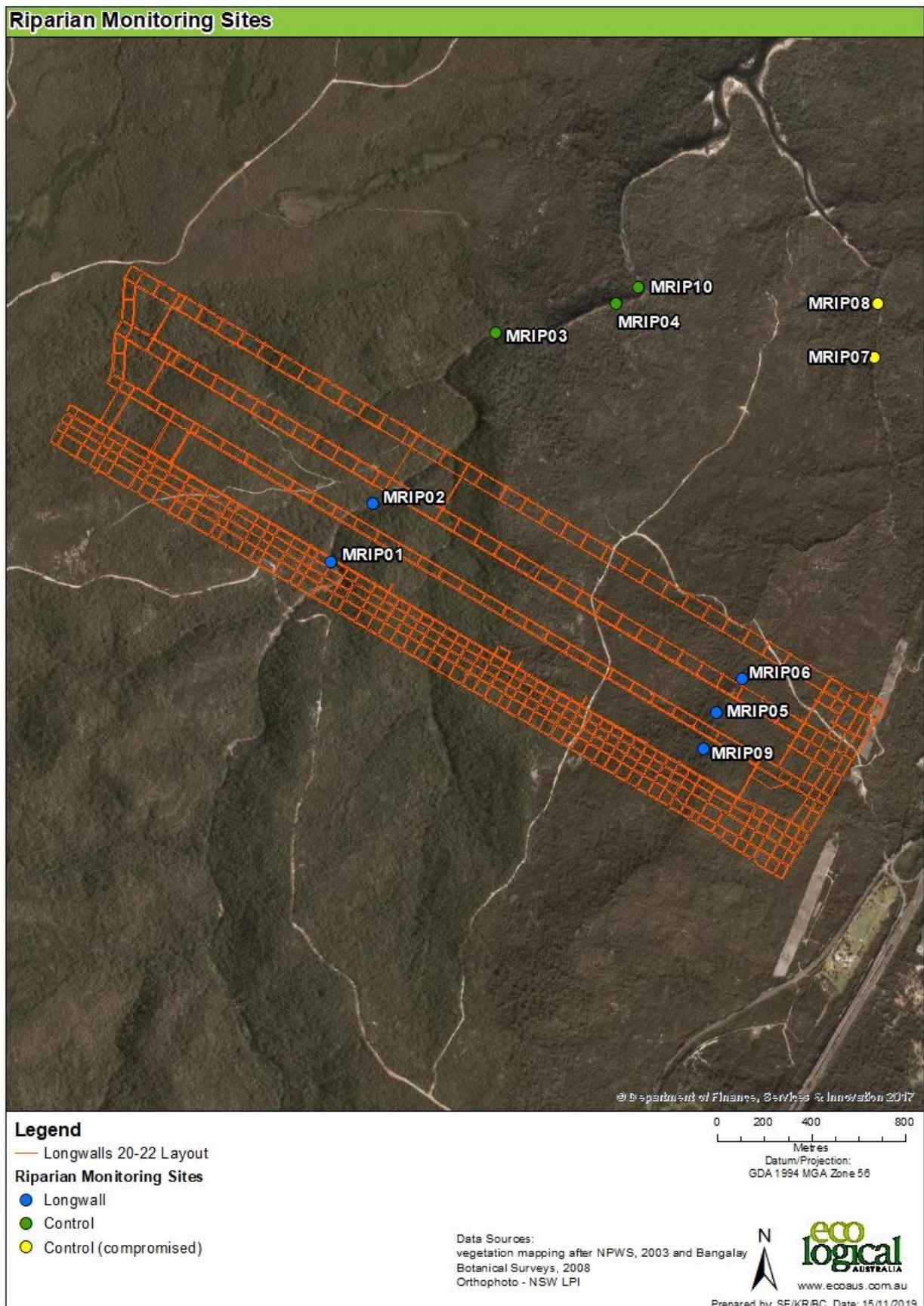


Figure 5: Riparian monitoring locations.

2.2.2 Quadrat monitoring

Permanent quadrats (20 m x 2 m) were established for monitoring riparian vegetation at the following sites:

- sites MRIP01, MRIP02, MRIP05, MRIP06 overlying Longwalls 20-22; and
- sites MRIP03, MRIP04, MRIP07, MRIP08 downstream of Longwalls 20-22.

The data collected for each quadrat included:

- vegetation structure;
- dominant species;
- estimated cover and height for each stratum;
- full floristics;
- estimated cover/abundance for each species using the seven-point modified Braun-Blanquet scale (as per **Section 2.1.2**); and
- condition/health rating for each species in the quadrat (as per **Section 2.1.2**).

Permanent photo points have been established for each quadrat.

2.2.3 Indicator species

Three indicator species were selected for population monitoring along Waratah Rivulet and the Eastern Tributary, namely *Prostanthera linearis*, *Lomatia myricoides* and *Schoenus melanostachys*. Twenty tagged individuals of each species are monitored at the following sites, with the exception of site MRIP08 where only 10 individuals of *Prostanthera linearis* were able to be found and tagged:

- sites MRIP01, MRIP02, MRIP05, MRIP06 and MRIP09 overlying Longwalls 20-22; and
- sites MRIP03, MRIP04, MRIP07, MRIP08 and MRIP10 downstream of Longwalls 20-22.

Population monitoring data collected includes:

- condition/health rating for each plant (as per **Section 2.1.3**); and
- reproductive rating (as per **Section 2.1.3**).

All locations of tagged individuals were recorded using a differential GPS providing sub-metre accuracy to enable accurate re-location during future surveys. Tagged individuals were also flagged in the upper branches providing a rapid visual reference point.

Copies of data sheets used for all the monitoring surveys are provided in **Appendix A**.

All swamp and riparian site details, including GPS waypoints, and transect details are provided in **Appendix B**.

2.3 Species identification and nomenclature

Field guides and standard texts used for the identification of plant species, included:

- Bishop (2000)
- Brooker & Kleinig (2006)

- Fairley & Moore (2010)
- Harden (1992-2002)
- Jacobs, Whalley, & Wheeler (2008)
- Jones (2006)
- Klaphake (2004)
- Pellow, Henwood, & Carolin (2009)
- Robinson (2003).

The naming of plant species recorded during the surveys follows the nomenclature presented in Harden (1992-2002), with subsequent taxonomic updates from NSW Flora Online on PlantNet (the NSW Plant Information Network System) (Royal Botanic Gardens and Domain Trust, Sydney 2019).

2.4 Survey timing

A summary of the timing of vegetation monitoring conducted in spring 2019 is outlined in **Table 1**.

Table 1: Survey timing spring 2019.

Date	Upland Swamp sites
04/09/2019	Swamp 111a
16/09/2019	Swamp 16 (in part), Swamp 18
01/10/2019	Swamp 101
02/10/2019	Swamp 16 (in part), Swamp 17
09/10/2019	Swamp 25
16/10/2019	Swamp 125
24/10/2019	Swamp 20
31/10/19	Swamp 24
5/11/2019	Dahlia Swamp, Woronora River 1 (in part)
6/11/2019	Woronora River 1 (in part), Woronora River South Arm
Date	Riparian monitoring sites
23/10/2019	MRIP05, MRIP06, MRIP09
28/10/2019	MRIP01, MRIP02
29/10/2019	MRIP03, MRIP04, MRIP10
30/10/2019	MRIP07, MRIP08

2.5 Weather conditions

The weather conditions during the spring 2019 survey period were generally similar to previous spring survey periods. Overall, the temperatures in spring 2019, as recorded at Bellambi Meteorological station, ranged from a minimum of 7.5°C to a maximum of 35.6°C, similar to previous spring seasons including spring 2008 (7.5°C – 36°C) and the previous spring 2018 (6.7°C – 36.3°C).

The total monthly rainfall from September 2008 to December 2019, encompassing the entire study period (November 2008 to November 2019), taken from the Metropolitan Colliery Meteorological Station Helensburgh 2, is presented with the long term mean monthly rainfall in **Table 3** and **Figure 6**.

The current spring 2019 survey was undertaken following very dry conditions from July 2017 onwards. Rainfall increased slightly above average for October and November 2018 and again in March 2019, but remained well below average for the majority of months preceding the spring 2019 survey. During the spring 2019 survey, rainfall increased slightly above average for the month of September 2019, but remained well below average for the other survey months.

The rainfall preceding and during vegetation surveys has been discussed in the previous reports (Eco Logical Australia 2010a – 2020)¹, and is summarised in the table below (**Table 2**).

Table 2: Summary of weather conditions throughout monitoring period (spring 2008 – spring 2019).

Survey Season / Period	Conditions prior to survey/s	Rainfall during survey/s
Spring 2008	Dry conditions	Low rainfall
Autumn 2009	Wet conditions (above average rainfall February 2009)	Moderate to high rainfall (rainfall slightly above average for all survey months)
Spring 2009	Dry conditions (most months well below average rainfall)	Low rainfall (below average rainfall for all survey months)
Autumn 2010	Wetter conditions	Moderate rainfall
Spring 2010 – Autumn 2012	Wet conditions (many months above average during this period)	Moderate to high rainfall
Spring 2012	Dry conditions (all winter months well below average rainfall)	Low rainfall
Autumn 2013	Wetter condition (many months above average rainfall immediately preceding)	Moderate to high rainfall
Spring 2013	Wetter conditions followed by dry winter	Moderate to high rainfall
Autumn 2014	Average conditions	Low rainfall
Spring 2014	Dry conditions	Low to moderate rainfall
Autumn 2015	Moderately wet conditions	High rainfall (exceptionally high rainfall in April 2015)
Spring 2015	Moderate to dry conditions (all winter months well below average rainfall)	Low to moderate rainfall
Autumn 2016	Wet conditions (above average rain in November 2015 and very heavy rain in January 2016)	Low rainfall (below average rainfall for all survey months)
Spring 2016	Wet conditions (heavy rain in June 2016)	Low rainfall (below average rainfall for all survey months)
Autumn 2017	Wet conditions (heavy rain in March 2017)	Low rainfall (below average rainfall for most of survey period)
Spring 2017 – Autumn 2018	Dry conditions (rainfall well below average from July 2017 onwards)	Low rainfall (below average rainfall for all survey months)
Spring 2018	Dry conditions (rainfall well below average from July 2017 onwards)	Moderate rainfall (above average rainfall for October and November 2018)
Autumn 2019	Dry conditions (rainfall well below average for all summer months)	Low to moderate rainfall (above average rainfall March 2019 only)
Spring 2019	Dry conditions (rainfall well below average for all late autumn and winter months)	Low to moderate rainfall (above average rainfall September 2019 only)

¹ Previous reporting has based mean rainfall data on Bureau of Meteorology Station No. 068228 (Bellambi). Reports since autumn 2017 have used Darkes Forest Station No. 068024 which has a longer rainfall record for comparison of long term means.

Table 3: Monthly rainfall for entire survey period (spring 2008 to spring 2019) taken from Metropolitan Colliery Meteorological Station Helensburgh 2.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008									89.0	53.5	64.5	82.0
2009	35.5	210.0	102.0	155.5	152.5	80.5	55.5	5.0	26.0	120.5	63.5	63.5
2010	37.0	182.5	118.5	30.5	89.5	169.0	47.5	43.0	173.5	75.0	103.5	90.5
2011	42.0	4.0	164.5	59.5	51.0	167.0	169.5	91.0	75.0	80.0	162.5	76.0
2012	180.5	242.0	235.5	117.5	15.0	129.5	45.5	5.5	22.5	63.5	54.5	28.0
2013	171.0	220.5	67.0	104.5	106.5	283.5	7.0	11.0	80.5	12.0	217.5	54.5
2014	31.5	50.5	218.5	59.0	11.5	28.0	8.0	93.0	25.5	79.5	39.5	182.5
2015	113.5	96.0	32.5	445.0	101.5	62.5	53.0	81.5	38.5	30.5	119.0	60.5
2016	275.0	31.0	46.5	55.5	36.0	394.5	92.5	84.0	52.5	15.5	36.0	67.5
2017	63.0	172.0	404.5	70.0	13.5	174.5	12.5	18.5	0.5	37.0	39.0	52.5
2018	38.0	83.0	139.0	19.0	11.5	95.5	1.0	16.0	41.0	175.5	117.0	93.5
2019	58.0	44.0	180.5	24.0	6.5	88.5	36.5	48.0	130.0	29.5	40.0	2.5
Mean*	131.8	158.7	154.3	126.1	128.1	145.8	96.0	88.9	77.2	91.5	104.9	103.0

Survey periods highlighted.

* Mean data taken from Bureau of Meteorology Station Number 068024 (Darkes Forest), established in 1894 (Source: www.bom.gov.au, Jan 2020). Each monthly long-term mean is calculated using all data obtained since the commencement of monitoring at Station 068024.

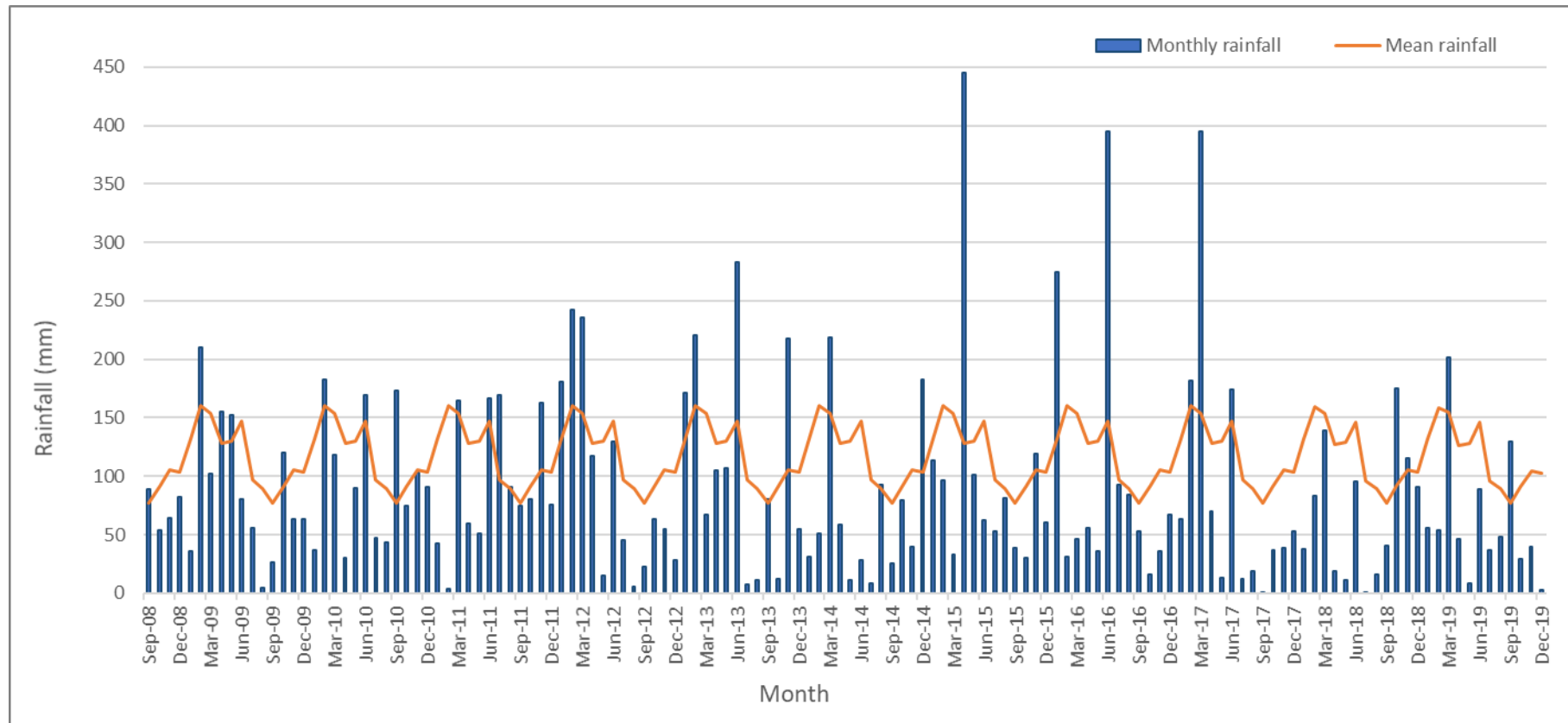


Figure 6: Monthly rainfall for the study area (September 2008 to December 2019).

Observational data from HELENSBURGH 2 Metropolitan Coal weather station (Source: Manly Hydraulics Laboratory, www.mhl.nsw.gov.au, Jan 2020). Mean data taken from Bureau of Meteorology Station Number 68024 (Darkes Forest), established in 1894 (Source: www.bom.gov.au, Jan 2020).

2.6 Assessment against performance indicators

The monitoring results from the spring 2019 survey have been analysed and assessed against the performance indicators developed for upland swamp vegetation monitoring and riparian vegetation monitoring in accordance with the Longwall 304 Biodiversity Management Plan (**Appendix C**).

2.6.1 Upland swamp vegetation

Visual observations

The information recorded during these inspections is used to make an assessment of changes in the condition of the swamps over time.

Transect/quadrat monitoring

The data collected from the transect/quadrat monitoring was analysed as follows:

- Analysis of the number of species (i.e. species richness) overtime and relative to control sites using analysis of variance (ANOVA). The purpose of ANOVA is to test for significant differences in floristic diversity over time. The analysis was conducted using the R statistical package v 3.6.2.
- Analysis of species lists using Cluster Analysis (ANOSIM). Cluster Analysis is a method used for combining similar objects into groups or clusters and is used to test for significant differences in species cover/abundance and condition scores overtime and relative to control sites. ANOSIM looks at groups of sites in multidimensional space and compares them with other groups to see if they are different. Data for the ANOSIM analysis were based on the average cover/abundance and average vegetation condition across all quadrats for each transect, whether a species was present or not: i.e. the transect is considered the unit of comparison. The analysis was conducted using the R statistical package v 3.6.2.

Indicator species monitoring

The data collected from indicator species monitoring is qualitatively analysed for the proportions of plants surviving, and differences in health and reproduction ratings over time and relative to control swamps.

Assessment against upland swamp vegetation performance indicator

The visual inspections, transect/quadrat data and population monitoring of indicator species is used to assess the upland swamp vegetation performance indicator:

The vegetation in upland swamps is not expected to experience changes significantly different to vegetation in control swamps.

2.6.2 Riparian vegetation

Visual inspections

The information recorded during these inspections will be used to make an assessment of changes in the condition of the riparian vegetation over time.

Quadrat monitoring

The vegetation structure data, including dominant species, height and estimated cover for each stratum, collected from the quadrat monitoring is qualitatively assessed. The full floristics and associated cover/abundance and condition data is analysed to provide an assessment of trends between monitoring

sites, and over time, in overall species richness as well as the cover/abundance and condition of particular species.

Indicator species monitoring

The data collected from the indicator species monitoring is qualitatively analysed for the proportion of plants surviving overtime and relative to control sites, and differences in health and reproduction ratings over time and relative to control sites.

Assessment against riparian vegetation performance indicator

The vegetation monitoring conducted at locations adjacent to riparian vegetation monitoring sites and areas traversed whilst accessing the monitoring sites is used to assess the extent of riparian dieback against the riparian vegetation performance indicator:

Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal.

The riparian vegetation performance indicator will be considered to be exceeded if vegetation monitoring:

- identifies an increase in the extent of vegetation dieback compared to that observed at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary; or
- identifies vegetation dieback greater than 50 cm from the stream at sites MRIP01, MRIP03, MRIP04, MRIP06, MRIP07, MRIP08, MRIP10 as a result of mine subsidence.

3 Results & discussion

A list of all flora species recorded during spring 2019 monitoring survey is presented in **Appendix D**.

3.1 Upland swamp vegetation monitoring

3.1.1 Visual inspections

Visual inspections were conducted across all upland swamp sites during the spring 2019 survey. Traverses covering the majority of the extent of each swamp were conducted, and the following provides a summary of the visual observations:

- No cracking of exposed bedrock areas or swamp sediments was observed in either longwall or control swamps, other than the rock displacement in Swamp 24 and minor surface cracking (weathering cracks) in Swamp 18 detected during baseline surveys (Eco Logical Australia 2010a).
- Areas in which active erosion was observed were all minor and limited to sheet erosion (Swamp 111a). No erosion impacts were recorded at any of the other swamps in spring 2019. Active erosion has previously been observed, at some stage throughout the monitoring period, at all longwall and control sites.
- The spring 2019 survey commenced following an extended dry period from July 2017 onwards. Throughout this period monthly rainfall has remained below average apart from October and November 2018 and March 2019, which all had above average rainfall. During the spring 2019 survey, rainfall for the month of September was also above average but remained well below average during October and November. The limited rainfall prior to and throughout the survey season is reflected in the occurrence of only minor seepage at longwall valley side swamps:
 - Swamp 16 (minor seepage along the road between Transect 1 and Transect 2);
 - Swamp 17 (minor seepage at Photo Point 4 and Photo Point C);
 - Swamp 18 (minor seepage at the bottom of Transect 3); and
 - Swamp 25 (minor seepage across terminal rocky step).

In the single Tea Tree Thicket longwall site, Swamp 20, there was visibly more seepage around the waterfall area (**Plate 1**) and Photo Point 1 than the previous two seasons. No seepage was recorded at any of the control sites in spring 2019.

- Across all valley side swamps, no changes in water colour or new areas of water ponding were observed in longwall swamps in spring 2019. One stagnant pool was observed in the creek line adjacent to Transect 2, in control site Swamp 125. Standing water was not observed throughout the single Tea Tree Thicket longwall site, Swamp 20, where it has been observed in previous seasons, however small pools were present in the rocky areas at the bottom of transect 1 (Photo Point 5) and moderate water flow was observed across the terminal rocky step. Iron-stained groundwater seeps have previously been observed in Swamp 20 on the terminal rocky step and/or the small rocky step adjacent to the end of Transect 1. In spring 2019, iron staining remained similar to previous survey periods (**Plate 1**).
- For the valley side swamps supporting Restioid Heath / Banksia Thicket, vegetation in spring 2019 at longwall and control sites was found to be in a range of conditions, varying from healthy to stressed, with a number of shrubs and ground layer species recorded with leaf yellowing and dieback, similar to autumn 2019. While the cause of the stressed vegetation is unknown, its occurrence within longwall and control swamps indicates that leaf yellowing and dieback is likely attributable to environmental conditions, including the stress associated with

drying out of shallow soils during below-average rainfall prior to the spring 2019 survey period, and not related to mining of Longwalls 20-22. Visual observations noted the following details regarding vegetation stress for particular species and vegetation layers:

- Individuals commonly found with yellowing foliage in both longwall and control swamps included *Banksia ericifolia* subsp. *ericifolia* (Swamps 17, 18, 25, 101 and 125), *Hakea gibbosa* (Swamps 18 and 111a), *H. teretifolia* (Swamps 17, 18, 24, 25, 101 and 111a) and *Petrophile pulchella* (Swamps 25, 101, 111a and 125). Individuals of these species observed with dieback were interspersed with healthy individuals of the same species.
- Within the shrub layer, previously unobserved individuals of *Banksia ericifolia* subsp. *ericifolia* with complete dieback were observed scattered throughout longwall site Swamp 18 only. Individuals with complete dieback of this, and other, species have been observed in previous seasons within both longwall and control swamps.
- Within the ground layer, sedge species observed with yellowing foliage and/or senescing culms were recorded in longwall and control sites (Swamps 17, 18, 24, 111a and 125) and included *Chordifex fastigiatus*, *C. dimorphus*, *Empodisma minus*, *Lepidosperma neesii*, *Lepyrodia scariosa* and *Schoenus brevifolius*.
- The stressed and senescent shrubs and ground layer species reported as common and widespread in Swamp 24 in previous seasons (spring 2017 and autumn 2018) have not increased in extent or number for the past three monitoring seasons, and the previously reported senescent shrubs have started to fall over. No seedlings of the affected species (*Banksia ericifolia* subsp. *ericifolia*, *Hakea teretifolia* and *Petrophile pulchella*) were observed in this swamp in spring 2017.
- For the Tea Tree Thickets swamps, vegetation at both longwall and control swamps was found to be generally in a good condition in spring 2019. Exceptions included the following:
 - Large patches of the fern *Gleichenia microphylla* were observed with dieback within all Tea Tree Thicket swamps (both longwall and control) in spring 2019. Dieback was variable between all swamps, with most dieback recorded within longwall Swamp 20 (north-eastern section and along Transect 1) and the lower end of control swamp Woronora River 1 (adjacent to Transect 1), as in previous seasons. However, it was noted that most patches were not recent dieback, being the same patches that have been noted in previous reports and are still standing due to the sheltered nature of these swamps. In addition, regrowth was frequently observed amongst this standing dead litter in spring 2019.
 - The sedge *Empodisma minus* was found to be in an improved condition in Swamp 20 compared to previous seasons. Whilst scattered senescing patches of this species were observed along Transect 1 and Transect 2, regrowth of this species was observed at the end of Transect 1 (around Photo Point 1a and Photo Point 5). In control swamps, this species remained in a healthy condition in spring 2019, with only isolated individuals recorded in the floristic survey with minor dieback (Condition 4) or some dead culms (Condition 3).
 - In addition to the two above-mentioned species, leaf-yellowing and minor dieback was observed in other understorey species at both longwall Swamp 20 and control sites, often forming patches of standing dead litter. Species commonly observed with dieback or yellowing of the foliage in the understorey included: *Chorizandra cymbaria* and *Lepidosperma limicola*. New growth of both these species was observed in longwall and control sites in spring 2019.
 - The condition of *Banksia robur* shrubs was similar within the single longwall swamp (Swamp 20) and the control swamps, with occasional individuals noted with yellowing and dead leaves. Reduced condition of *Banksia robur* was also related to leaf herbivory across all sites, although some new leaf desiccation was also observed.

- No weed species were observed within any of the longwall or controls swamps during the spring 2019 visual inspections.



Plate 1: Swamp 20, Photo Point 1, showing waterflow and minimal iron-stained seepage – spring 2019.

3.1.2 Transect/quadrat monitoring

Vegetation structure, dominant species, and estimated cover for each stratum

The vegetation structure, dominant species and estimated cover for each stratum at upland swamp monitoring sites is provided in **Appendices E** and **F**.

The vegetation structure, dominant species and estimated cover for each stratum has been variable across all seasons, with variations recorded between sites, seasons and strata. This variability is considered to reflect both the natural variations in the height and cover of vegetation structural layers through time, as well as the subjective nature of the data collection. Within the variability of this dataset, a general trend towards increasing height and cover of the mid layer vegetation and a reduction in cover of the ground layer continues to occur across all longwall and control sites. The increase in height and foliage cover of the mid-storey and subsequent decrease in ground cover is a recognised pattern which typically occurs within upland swamps, with increased time since fire (Keith & Bradstock 1994). With increased time since fire, upland swamps commonly form dense thickets dominated by obligate seeders such as *Banksia ericifolia* subsp. *ericifolia*, *Hakea teretifolia* and *Leptospermum squarrosum* with smaller shrubs and sedges tending to become sparser and less diverse. The formation of these dense thickets is mediated by fires, which reduces the cover of these obligate seeders.

Species richness

A summary of species richness within swamp quadrats since spring 2009 is provided in **Figure 7**, **Figure 8** and **Table 4**. The raw data for each swamp is presented in **Appendices E** and **F**.

As observed for the baseline monitoring period (spring 2009 to autumn 2010), species richness in spring 2019 was higher in valley side swamps supporting Restioid Heath / Banksia Thicket (Swamps 16, 17, 18, 24, 25, 101, 111a, and 125) than in swamps supporting Tea Tree Thicket (Swamp 20, Woronora River 1, Woronora River south arm and Dahlia Swamp) (**Figure 7**, **Figure 8** and **Table 4**).

Species richness within individual valley side swamps in spring 2019 was within the range of previous seasons for most sites, with the exception of longwall Swamp 25 and control Swamp 101 where species richness was lower (by three and two species, respectively) than previously recorded across all survey seasons (**Figure 7**). An overall decrease in species richness has been recorded at Swamp 25 since spring 2016 (declining by 14 species over that time) and Swamp 101 since spring 2017 (declining by 15 species over that time). At longwall sites, a large increase in species richness was recorded at two sites (Swamps 16 and 18) compared to the autumn 2019 survey. A large decrease in species richness was recorded within one longwall site (Swamp 17), whilst a small to moderate decrease was recorded at the remaining longwall site (Swamps 24). A large increase in species richness was recorded at one control site (Swamp 111a) while the remaining control site (Swamp 125) recorded no change, compared to autumn 2019.

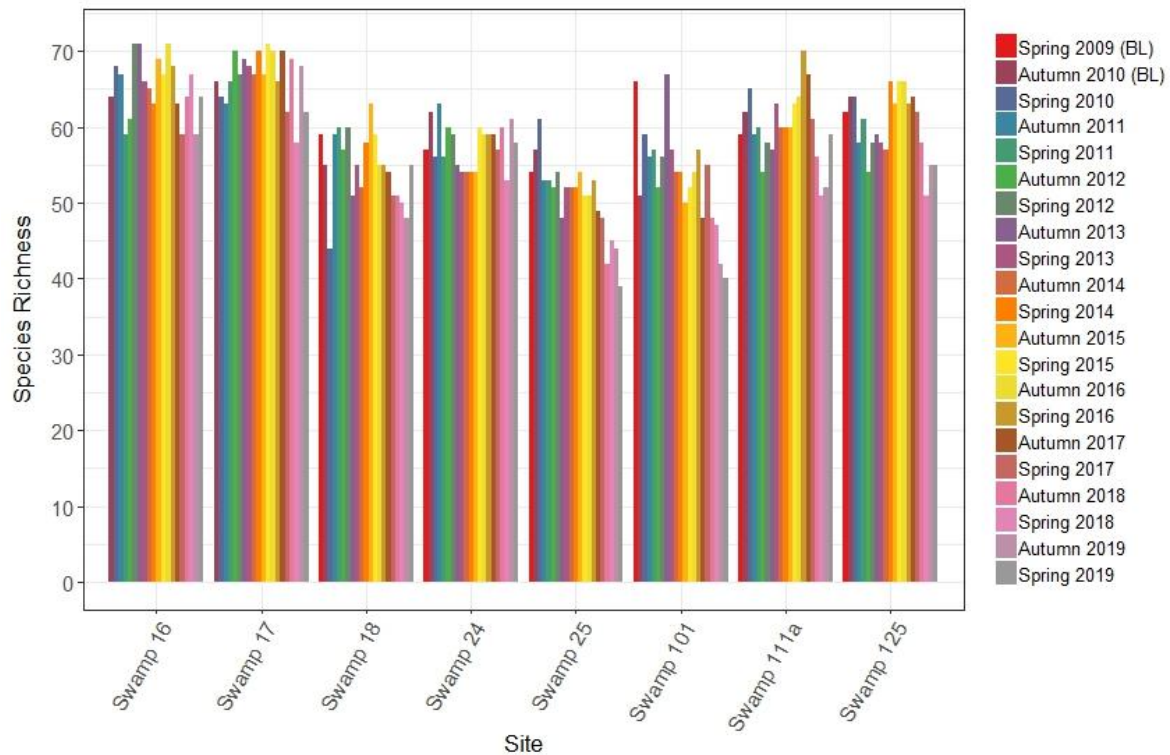


Figure 7: Native species richness within upland swamps supporting Restioid Heath / Banksia Thicket, spring 2009 to spring 2019, BL = baseline.

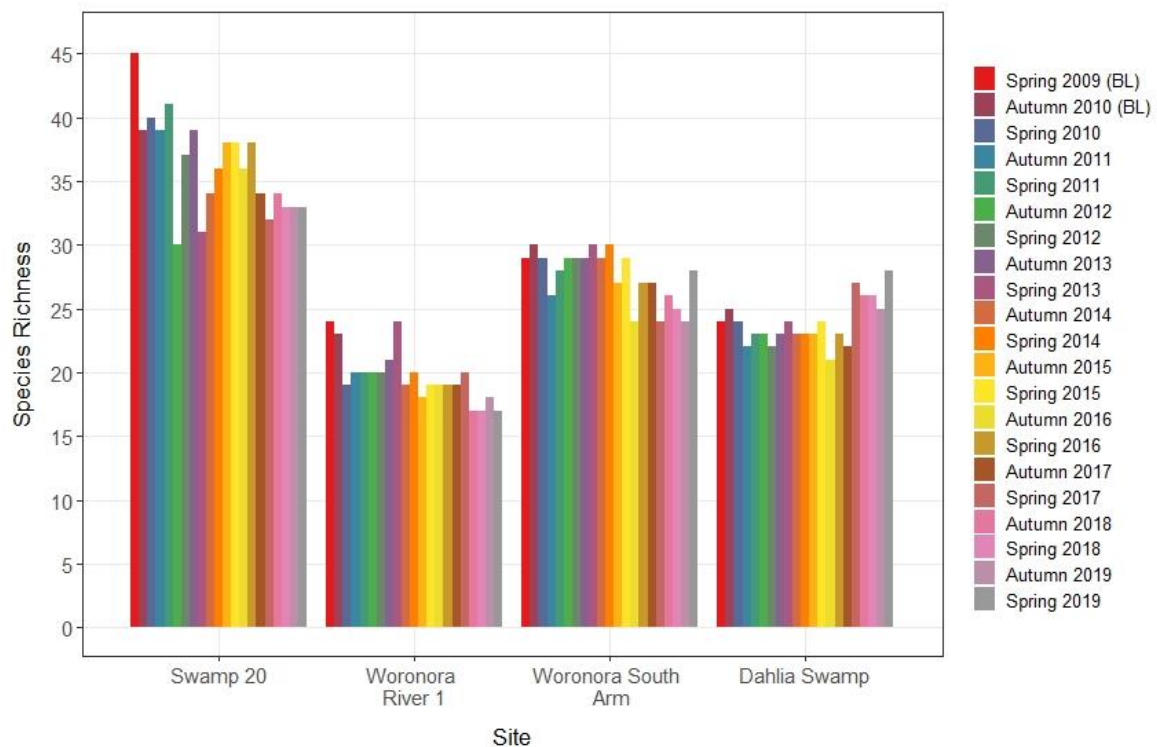


Figure 8: Native species richness within upland swamps supporting Tea Tree Thicket, spring 2009 to spring 2019, BL = baseline².

² Figures for Dahlia Swamp for autumn 2018 and spring 2018 differ slightly from previous reports due to error in exotic species definition.

Species richness within individual Tea Tree Thicket sites in spring 2019 was within the range of previous seasons at the single longwall (Swamp 20) and all control sites (Dahlia Swamp, Woronora River 1 and Woronora River south arm) (**Figure 8**). In spring 2019, no change in species richness from autumn 2019 was recorded for the single longwall swamp supporting Tea Tree Thicket, Swamp 20. A small decrease in species richness was recorded at one control site supporting Tea Tree Thicket (Woronora River 1), whilst a moderate increase was observed at the other two control sites (Dahlia Swamp and Woronora River south arm), compared to autumn 2019.

The changes in species richness recorded in spring 2019 are consistent with the fluctuations observed within the baseline monitoring period. The decrease in species richness from the previous season recorded at longwall site Swamp 25 (five species) is part of a decreasing trend that has previously been observed at this site since spring 2016. While the cause of this decrease is unknown, its occurrence within control site Swamp 101 within a similar time period (since spring 2017), indicates that dieback may be attributable to environmental conditions, including the stress associated with drying out of shallow soils during the extended period of below-average rainfall from July 2017 experienced prior to, and primarily throughout, the spring 2019 survey period.

No weed species were recorded as part of the full floristic data collected within any of the longwall or control upland swamps.

Table 4: Number of native species recorded in upland swamps (spring 2009 to spring 2019).

Site	Spring 2009	Autumn 2010	Spring 2010	Autumn 2011	Spring 2011	Autumn 2012	Spring 2012	Autumn 2013	Spring 2013	Autumn 2014	Spring 2014	Autumn 2015	Spring 2015	Autumn 2016	Spring 2016	Autumn 2017	Spring 2017	Autumn 2018	Spring 2018	Autumn 2019	Spring 2019
Swamp 16 (RH)	-	64	68	67	59	61	71	71	66	65	63	69	67	71	68	63	59	64	67	59	64
Swamp 17 (RH)	-	66	64	63	66	70	67	69	68	67	70	67	71	70	66	70	62	69	58	68	62
Swamp 18 (RH)	59	55	44	59	60	57	60	51	55	52	58	63	59	55	55	54	51	51	50	48	55
Swamp 24 (RH)	57	62	56	63	56	60	59	55	54	54	54	54	60	59	59	59	57	60	53	61	58
Swamp 25 (RH)	54	57	61	53	53	52	54	48	52	52	52	54	51	51	53	49	48	42	45	44	39
Swamp 101 (RH)	66	51	59	56	57	52	56	67	57	54	54	50	52	54	57	48	55	48	47	42	40
Swamp 111a (RH)	59	62	65	59	60	54	58	57	63	60	60	60	63	64	70	67	61	56	51	52	59
Swamp 125 (RH)	62	64	64	58	61	54	58	59	58	57	66	63	66	66	63	64	62	58	51	55	55
Swamp 20 (TTT)	45	39	40	39	41	30	37	39	31	34	36	38	38	36	38	34	32	34	33	33	33
Woronora River 1 (TTT)	24	23	19	20	20	20	20	21	24	19	20	18	19	19	19	19	20	17	17	18	17
Woronora River south arm (TTT)	29	30	29	26	28	29	29	29	30	29	30	27	29	24	27	27	24	26	25	24	28
Dahlia Swamp (TTT) ³	24	25	24	22	23	23	22	23	24	23	23	23	24	21 (2)	23	22	27	26 (1)	26 (2)	25 (1)	28

Numbers in brackets indicate the number of exotic species recorded, additional to native species

RH = Restioid Heath; TTT = Tea Tree Thicket

³ Figures for Dahlia Swamp for autumn 2018 and spring 2018 differ slightly from previous reports due to error in exotic species definition.

Transect/quadrat monitoring analysis – species richness

Upland swamp sites were split into two groups for analysis on the basis of their floristic differences: Restioid Heath / Banksia Thicket and Tea Tree Thicket swamps.

For the Restioid Heath / Banksia Thicket sites, species richness data were analysed for each season using analysis of variance (ANOVA). No significant differences were detected between longwall and control sites in any season including the current spring 2019 ($p = 0.481$; **Figure 9**).

As there is only one Tea Tree Thicket longwall site, the species richness data was not analysed using ANOVA. Instead, a graphical representation of the data is presented in **Figure 10**. Species richness in spring 2019 within the single longwall swamp (Swamp 20) remained greater than the Tea Tree Thicket control swamps, as in all previous seasons. Species richness in Swamp 20 has been variable over the survey seasons and for spring 2019, 33 species were recorded. Although less than that recorded during the baseline seasons, species richness within Swamp 20 remains within the range of that recorded during all other seasons from spring 2010 (richness ranging from 30 to 41 species). In this respect, the performance indicator has not been exceeded in regard to this analysis.

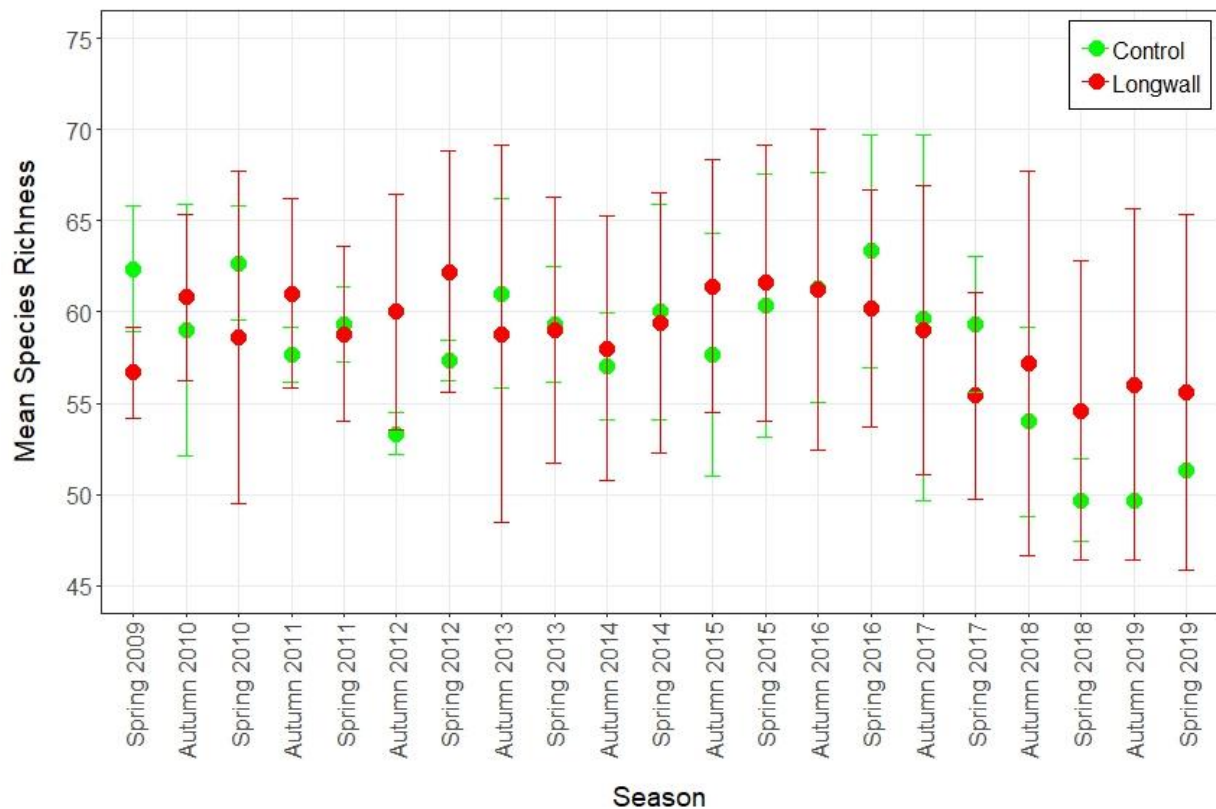


Figure 9: Mean species richness in upland swamps supporting Restioid Heath / Banksia Thicket, spring 2009 to spring 2019.

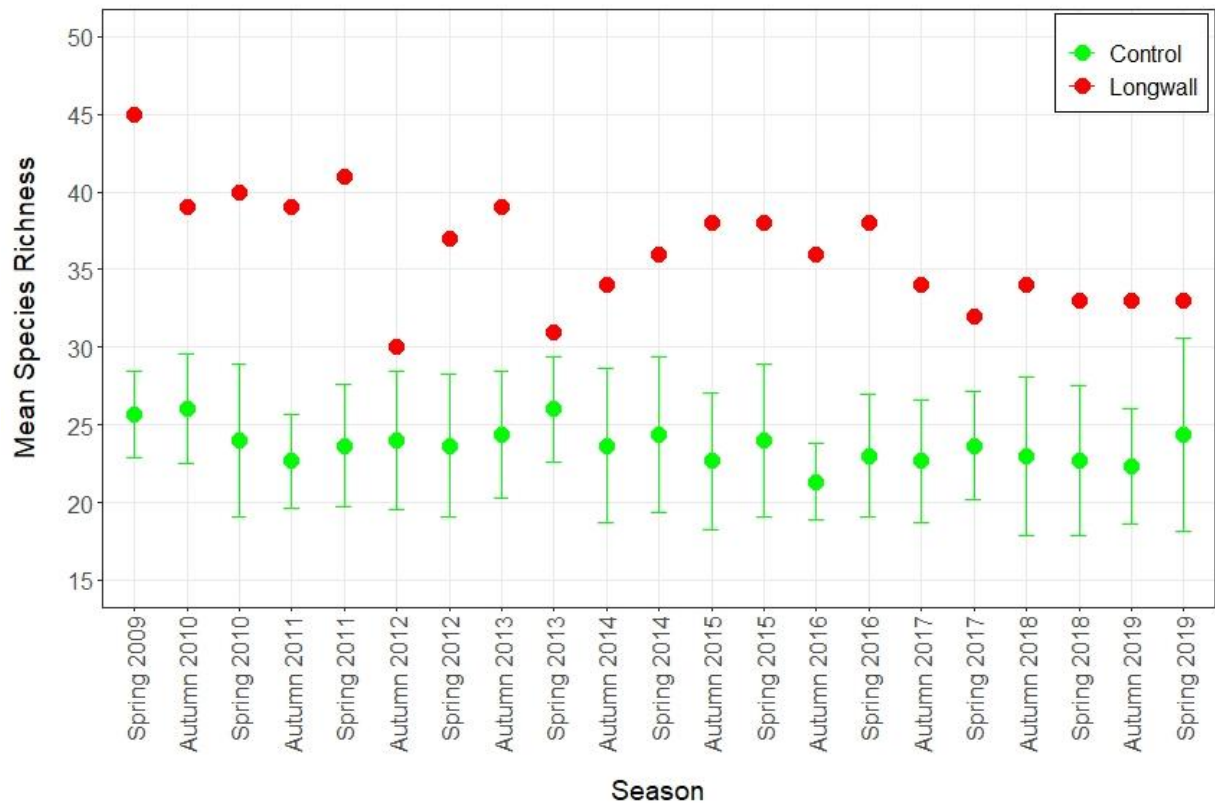


Figure 10: Mean species richness in upland swamps supporting Tea Tree Thicket, spring 2009 to spring 2019.

Cover/abundance and condition

The cover/abundance and condition ratings for each species are provided in **Appendices E and F**.

Fluctuations in species cover/abundance were recorded across all sites. No patterns of increasing or decreasing cover/abundance were identified in relation to individual species across sites or groups of species (i.e. swamp indicator species, generalist species, shrubs, ground covers) within sites.

Fluctuations in vegetation condition were also recorded across all sites. Generally, vegetation within upland swamps was in a healthy condition (Condition 5) to minor dieback (Condition 4) throughout the survey period and observations of increased stress were limited to a small number of species and scattered individuals within most swamps.

Within Restioid Heath / Banksia Thicket sites, a number of species were observed with dieback and leaf yellowing in both longwall and control sites, having condition ratings ranging from minor (Condition 4) to severe (Condition 1) damage/dieback. Species most commonly observed with some dieback were predominantly ground layer sedge species: *Chordifex dimorphus*, *C. fastigiatus*, *Empodisma minus*, *Lepidosperma filiforme*, and *Schoenus brevifolius*.

The majority of species which were observed with dieback within longwall swamps in spring 2019 were also observed with dieback within control swamps (where the species occurred in both longwall and control swamps) (**Table 5**). Seventeen species were observed with dieback in longwall swamps and not observed with dieback within control swamps, however seven of these species were not found in control sites in spring 2019. Dieback of these species was limited to a small number of individuals, generally displaying minor dieback (Condition 4) or some dead branches (Condition 3) (eg. *Epacris microphylla*), rarely with many dead branches (Condition 2) (*Leptospermum arachnoides*) or severe dieback

(Condition 1) (*Leucopogon microphyllus* var. *microphyllus*). Eight species were observed with dieback within control swamps and not observed with dieback within longwall swamps, however three of these species were not found in longwall sites in spring 2019 (**Table 5**). A full list of species and their condition scores, including those observed with dieback, within longwall and control swamps supporting Restioid Heath / Banksia Thicket in spring 2019 is provided in **Appendix E**.

Table 5: Species with dieback (Condition score <5) in longwall and control sites supporting Restioid Heath / Banksia Thicket, spring 2019.

LONGWALL Sites only	CONTROL Sites only	LONGWALL & CONTROL Sites
<i>Actinotus minor</i>	<i>Banksia oblongifolia</i>	<i>Baeckea imbricata</i>
<i>Baloskion gracile</i> *	<i>Boronia parviflora</i>	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
<i>Boronia ledifolia</i> *	<i>Chorizandra cymbaria</i> **	<i>Bauera microphylla</i>
<i>Bossiaea scolopendria</i> *	<i>Gahnia sieberiana</i> **	<i>Cassytha glabella</i>
<i>Dampiera stricta</i>	<i>Lepidosperma neesii</i>	<i>Chordifex dimorphus</i>
<i>Dillwynia retorta</i> *	<i>Ptilothrix deusta</i>	<i>Chordifex fastigiatus</i>
<i>Entolasia stricta</i>	<i>Selaginella uliginosa</i> **	<i>Cyathochaeta diandra</i>
<i>Eucalyptus oblonga</i> *	<i>Sprengelia incarnata</i>	<i>Empodisma minus</i>
<i>Hibbertia riparia</i>		<i>Epacris microphylla</i>
<i>Hibbertia serpyllifolia</i>		<i>Epacris obtusifolia</i>
<i>Kunzea capitata</i> *		<i>Hakea gibbosa</i>
<i>Leptospermum arachnoides</i>		<i>Hakea teretifolia</i>
<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>		<i>Isopogon anethifolius</i>
<i>Lomandra obliqua</i>		<i>Lepidosperma filiforme</i>
<i>Mirbelia rubiifolia</i>		<i>Leptocarpus tenax</i>
<i>Pultenaea aristata</i>		<i>Lepyrodia scariosa</i>
<i>Pultenaea stipularis</i> *		<i>Leucopogon esquamatus</i>
		<i>Petrophile pulchella</i>
		<i>Platysace linearifolia</i>
		<i>Schoenus brevifolius</i>
		<i>Xanthorrhoea resinosa</i>

* species not found in control sites in spring 2019

** species not found in longwall sites in spring 2019

The average vegetation condition for each species, that is the mean of the vegetation condition scores recorded for each species across an individual swamp, was calculated from the spring 2019 data and compared to previous seasons. In spring 2019, the number of species that had an average vegetation condition less than 5 was within the range of previous seasons for most sites, with the exception of longwall Swamp 25 and control Swamp 101. Both of these sites had fewer species with an average condition less than 5 than had previously recorded throughout the entire monitoring period. When compared to the previous season, one longwall site (Swamp 17) recorded an increase in the number of species with an average condition less than 5 (13 species in autumn 2019 to 16 species in spring 2019). A similar increase was observed at two control sites (Swamp 111a – 13 species in autumn 2019 to 16 species in spring 2019; Swamp 125 – 16 species in autumn 2019 to 18 species in spring 2019). The remaining longwall and control sites recorded a decrease in the number of species with an average condition less than 5, in spring 2019.

Within Tea Tree Thicket swamps, vegetation was also generally observed in a healthy condition, although dieback was recorded across a number of species within both longwall and control swamps. Within

longwall Swamp 20 the main species observed with dieback were also observed with similar levels of dieback within control swamps (where the same species were present within control swamps) including *Banksia robur*, *Empodisma minus*, *Gleichenia microphylla*, *Sprengelia incarnata* and *Xanthorrhoea resinosa*. Two species recorded with dieback within Swamp 20 were observed in a healthy condition throughout control swamps (*Bauera rubioides* and *Gahnia sieberiana*). For these species, the observed dieback within Swamp 20 was limited to a small number of quadrats with only minor dieback (Condition 4) or rarely many dead branches (Condition 2). Individuals of these species were also present in a healthy condition within Swamp 20 and it was noted in the Visual Observations that there was abundant growth and flowering of *Bauera rubioides* along the bottom end of Transect 1. Six species were observed with dieback within control swamps but were not observed with dieback within Swamp 20 (*Banksia ericifolia* subsp. *ericifolia*, *Baumea* spp., *Chorizandra cymbaria*, *Hakea teretifolia*, *Leptospermum grandifolium* and *L. juniperinum*).

In recent seasons three species, *Empodisma minus*, *Gleichenia dicarpa* and *Gleichenia microphylla*⁴, have been noted for being recorded in a variable condition within Swamp 20, with dieback ranging from minor (Condition 4) to severe damage/dieback (Condition 1). For several seasons, dieback has been particularly evident in the north-eastern portion of the swamp in the vicinity of the piezometer site and extending downslope and along Transect 1. Based on the plot data in spring 2019, *Empodisma minus* was in an improved condition overall, with this species recorded as healthy (Condition 5) in the majority of plots (17) in which it occurred across the whole site, whilst it was recorded with minor dieback (Condition 4) in one plot and with some dead branches (Condition 3) in another plot.

The condition of *Gleichenia* spp. was improved along Transect 1, with individuals recorded as healthy (Condition 5) in the two plots in which it was observed, in spring 2019. In one other plot along this transect, old dead individuals were observed but no live cover was recorded. The condition of *Gleichenia* spp. within the rest of Swamp 20 also showed an improvement, with the average condition across Transect 2 and 3 rising to 4.8, up from 3.5 in autumn 2019, and the low of 2.5 recorded in spring 2018. In contrast to spring 2018, when *Gleichenia microphylla* was recorded in a healthy condition in only one plot (out of 24), with half of the plots recording the condition of this species as either many dead stems (Condition 2) or severe dieback (Condition 1), in spring 2019 the majority (22) of the plots in Transects 2 and 3 were recorded as healthy (Condition 5) or with minor dieback (Condition 4). In control swamp Woronora River 1, *Gleichenia microphylla* has been recorded in a similarly variable condition over several seasons. In spring 2019 this species was recorded with severe dieback (Condition 1) and many dead branches (Condition 2) in one plot each, while the remaining three plots were observed in a healthy condition (Condition 5), which represents an overall improvement compared to previous seasons. In control swamp Woronora River south arm, the condition of *Gleichenia microphylla* has improved since autumn 2019, with conditions similar to that of longwall Swamp 20, ranging from some dead branches (Condition 3), minor dieback (Condition 4) or healthy (Condition 5). In the remaining control swamp, Dahlia Swamp, the condition of *Gleichenia microphylla* remains similar to the previous seasons, being predominantly recorded as healthy (Condition 5) or with minor dieback (Condition 4).

Transect/quadrat monitoring analysis – vegetation cover/abundance

Upland swamp sites were split into two groups for analysis on the basis of their floristic differences: Restioid Heath / Banksia Thicket and Tea Tree Thicket swamps. Analysis of similarities (ANOSIM) was used to examine the differences in vegetation composition, measured by species cover/abundance, between the longwall and control sites for each season, and the results are presented in **Table 6**. As

⁴ The two *Gleichenia* spp. are treated together here as there has been misidentification in some plots along Transect 1 in previous seasons.

there is only one Tea Tree Thicket longwall site, differences in vegetation cover/abundance was not analysed using ANOSIM.

Significant differences in vegetation composition between longwall and control sites, as measured by species cover/abundance, were observed in the baseline period of spring 2009. No significant differences have been observed from the autumn 2010 baseline period or in any subsequent survey period up to spring 2015. Significant differences have been recorded since autumn 2016 through to the previous autumn 2019 survey, apart from autumn 2017, when the difference was marginal, but not statistically significant. In the current spring 2019 survey, no significant difference in vegetation composition between longwall and control sites was recorded (**Table 6**).

Table 6: Analysis of Similarities (ANOSIM) of vegetation cover/abundance in control versus longwall upland swamp sites (spring 2009 to spring 2019).

Season	R statistic	p-value
Spring 2009	0.188	0.017
Autumn 2010	0.068	0.189
Spring 2010	0.124	0.071
Autumn 2011	0.064	0.208
Spring 2011	0.076	0.150
Autumn 2012	0.019	0.383
Spring 2012	0.122	0.116
Autumn 2013	-0.012	0.477
Spring 2013	0.004	0.414
Autumn 2014	-0.012	0.479
Spring 2014	0.034	0.342
Autumn 2015	0.056	0.303
Spring 2015	0.106	0.090
Autumn 2016	0.161	0.045
Spring 2016	0.195	0.019
Autumn 2017	0.144	0.053
Spring 2017	0.212	0.022
Autumn 2018	0.188	0.027
Spring 2018	0.170	0.038
Autumn 2019	0.177	0.037
Spring 2019	0.095	0.101

Baseline period highlighted; seasons where significant differences for species richness were recorded (p-value <0.05) are bold. Marginal differences in red font.

A qualitative review of individual site cover/abundance data indicated that in spring 2017, there were differences in vegetation cover/abundance changes between longwall and control sites, with more species in longwall swamps recording small declines in cover/abundance since the previous autumn 2017, compared to control swamps. In the current spring 2019 survey, as with all surveys after spring 2017, there was no trend in the vegetation cover/abundance data between longwall and control sites. Three longwall sites (Swamps 16, 18 and 24) and all control sites each had more species with an increase in their average cover/abundance score from autumn 2019 than species which had decreases (**Table 7**).

Some of the species recording declines in cover/abundance values in longwall swamps are not found within control swamps, and are represented by one or two individuals only. Many of these species occur in longwall Swamps 16 and 17, which are considered marginal upland swamps as they contain a number of woodland species. Species showing a change in cover/abundance in spring 2019 from autumn 2019 in longwall and control sites are listed **Appendix E**.

Table 7: Number of species found to have an increase or decrease in the average condition score in spring 2019, compared to autumn 2019.

	Increased Cover/Abundance	Decreased Cover/Abundance
Longwall Sites		
Swamp 16	21	13
Swamp 17	20	26
Swamp 18	19	15
Swamp 24	22	20
Swamp 25	12	21
<i>Total number of species</i>	<i>23 (12)</i>	<i>30 (12)</i>
Control Sites		
Swamp 101	18	13
Swamp 111a	26	9
Swamp 125	23	20
<i>Total number of species</i>	<i>18 (4)</i>	<i>7</i>

Numbers in brackets () indicate species only recorded in either longwall or control sites, in spring 2019.

Overall there does not appear to be any trend in the data set to indicate why significant differences have previously been recorded for vegetation cover/abundance. While no significant difference in species composition between longwall and control sites has been observed in the current season, where differences have been observed in a number of the more recent monitoring seasons since the commencement and completion of longwall mining, the magnitude of difference remained low, as measured by the R statistic, and is similar to observations made during the baseline periods (spring 2009).

Transect/quadrat monitoring analysis – vegetation condition

Analysis of similarities (ANOSIM) was also used to examine the differences in vegetation composition, as measured by the condition of their species assemblages, between the longwall and control sites for each season, and the results are presented in **Table 8**. As with vegetation cover/abundance, differences in vegetation condition for Tea Tree Thickets were not analysed using ANOSIM, due to there being only one Tea Tree Thicket longwall site.

Significant differences between longwall and control sites in the upland swamp vegetation communities, as measured by the condition of their species assemblages, were observed in the first four seasons (spring 2009 to autumn 2011) including the baseline seasons of spring 2009 and autumn 2010. No significant differences were recorded from spring 2011 to autumn 2015 and in the previous autumn 2019 survey. From spring 2015 to the spring 2018 season, significant differences have been observed. In the current spring 2019 survey, no significant difference in vegetation condition was observed, however as in the previous season the result was marginal. As with the vegetation cover/abundance results, this indicates that the vegetation communities vary between control and longwall sites, based on the

vegetation condition of their species assemblages, however the low R statistic indicates that the treatment variable (control versus longwall) has a weak effect on this difference (**Table 8**).

Table 8: Analysis of Similarities (ANOSIM) of vegetation condition in control versus longwall upland swamp sites (spring 2009 to spring 2019).

Season	R statistic	p-value
Spring 2009	0.176	0.012
Autumn 2010	0.153	0.046
Spring 2010	0.165	0.039
Autumn 2011	0.513	0.002
Spring 2011	0.112	0.108
Autumn 2012	0.072	0.233
Spring 2012	0.088	0.186
Autumn 2013	0.002	0.454
Spring 2013	0.090	0.196
Autumn 2014	0.049	0.311
Spring 2014	0.079	0.203
Autumn 2015	0.075	0.221
Spring 2015	0.152	0.037
Autumn 2016	0.198	0.017
Spring 2016	0.212	0.011
Autumn 2017	0.171	0.035
Spring 2017	0.208	0.028
Autumn 2018	0.195	0.024
Spring 2018	0.197	0.018
Autumn 2019	0.1509	0.059
Spring 2019	0.152	0.055

Baseline period highlighted; seasons where significant differences for species richness were recorded (p-value <0.05) are bolded. Marginal differences in red font.

A qualitative review of individual site condition data did not indicate differences in vegetation condition values between longwall and control sites, with a similar number of species recording a decline in average vegetation condition since autumn 2019 in longwall and control sites (**Table 9**). At each site the number of species that had decreased in average vegetation condition since autumn 2019 were tallied, along with the number of species that had increased in average vegetation condition. This showed that across all longwall or control sites there were more species that had increased in condition than had decreased, with the exception of Swamp 18 (**Table 9**). Across all longwall sites, twenty-five species declined in average condition but did not decline at control sites between autumn 2019 and spring 2019. Across all control sites, sixteen species declined in average condition but did not decline at any longwall sites, between autumn 2019 and spring 2019. Species showing change in condition in spring 2019 from autumn 2019 in longwall and control sites are listed **Appendix E**.

Table 9: Number of species found to have an increase or decrease in the average condition score in spring 2019, compared to autumn 2019.

	Increased Condition	Decreased Condition
Longwall sites		
Swamp 16	10	8
Swamp 17	8	10
Swamp 18	16	8
Swamp 24	8	7
Swamp 25	12	4
<i>Total number of species</i>	33 (4)	29 (4)
Control sites		
Swamp 101	16	2
Swamp 111a	9	9
Swamp 125	12	7
<i>Total number of species</i>	21 (1)	17 (1)

Numbers in brackets () indicate species only recorded in either longwall or control sites, in spring 2019.

Overall there does not appear to be any trend in the data set to indicate why significant differences have previously been recorded for vegetation condition. However, while significant differences in vegetation condition between longwall and control sites have been observed in these latter seasons since the commencement and completion of longwall mining, the magnitude of difference remained low, as measured by the R statistic, and is similar to observations made during the baseline periods (spring 2009 and autumn 2010).

Whilst significant differences in both vegetation cover/abundance and vegetation condition were recorded during the baseline monitoring seasons and survey seasons following the commencement of mining Longwalls 20-22, the associated R statistic has always remained low, indicating that the magnitude of differences has remained similarly low over this time (**Table 6** and **Table 8**). The observed differences, therefore, are considered attributable to natural differences in vegetation cover/abundance and condition between individual swamps. The performance indicator has not been exceeded in regard to this analysis. Notwithstanding this, given the small sample size of this study, consideration has been given to examining why the communities are varying between longwall and control sites.

3.1.3 Indicator species monitoring

Indicator species monitoring data, including a condition/health rating and reproductive rating for each plant, are provided in **Appendices E** and **F**.

Condition scale

Over the entire survey period, including baseline monitoring period (i.e. all surveys up to and including autumn 2010), and across all valley side swamps supporting Restioid Heath / Banksia Thicket, there has been a general decrease in the mean vegetation condition of the tagged indicator species (**Figure 11**, **Figure 12** and **Figure 13**). This decrease has occurred at both longwall and control swamps and is considered to reflect the natural fluctuations in plant health associated with herbivory, resource competition and ageing plants.

In spring 2019, the mean vegetation condition for tagged *Pultenaea aristata* and *Sprengelia incarnata* individuals was greater at longwall sites than control sites, whilst it was the same for *Epacris obtusifolia* (**Figure 11**, **Figure 12** and **Figure 13**). The mean vegetation condition of tagged *Epacris obtusifolia*, *Pultenaea aristata* and *Sprengelia incarnata* individuals in control sites and for *Epacris obtusifolia* in longwall sites was lower in the current spring 2019 survey than previously recorded across all seasons. In spring 2019, the mean vegetation condition for both *Pultenaea aristata* and *Sprengelia incarnata* has increased in longwall sites when compared to the previous season, autumn 2019.

Within Tea Tree Thicket monitoring sites, the mean vegetation condition of tagged *Callistemon citrinus* and *Leptospermum juniperinum* individuals has remained relatively consistent in both longwall and control sites across all seasons, with no observed decline over time, as has been observed in Restioid Heath / Banksia Thicket sites. Although not as extreme as in Restioid Heath / Banksia Thicket sites, tagged *Banksia robur* individuals in both longwall and control sites have shown an overall decline in condition since monitoring began, most noticeably since spring 2017. The mean vegetation condition of tagged indicator species within Tea Tree Thicket vegetation has varied between longwall and control swamps in individual seasons for each species (**Figure 14**, **Figure 15** and **Figure 16**). Generally, the mean vegetation condition of tagged indicator species has been similar in the longwall site, Swamp 20, and control sites over time for *Banksia robur* and *Callistemon citrinus*, whilst for *Leptospermum juniperinum* the condition has been consistently higher at the longwall site since autumn 2014.

In spring 2019, the mean vegetation condition for tagged *Banksia robur* in Tea Tree Thicket swamps was similar between the longwall site, Swamp 20, and control sites, as indicated by the overlapping error bars (**Figure 14**), whilst for *Callistemon citrinus* mean vegetation condition was higher at control sites (**Figure 15**). As has been observed in previous seasons, the mean vegetation condition of *Leptospermum juniperinum* was higher at longwall sites than at control sites (**Figure 16**).

In spring 2019, the mean vegetation condition for tagged individuals of both *Banksia robur* and *Callistemon citrinus* has increased in both longwall and control sites when compared to the previous season, autumn 2019. For tagged individuals of *Leptospermum juniperinum*, the mean vegetation condition at control swamps was lower in the current spring 2019 survey than previously recorded levels across all seasons. At the longwall site, Swamp 20, the mean vegetation condition of *Leptospermum juniperinum* individuals remained high and well within the range recorded across all seasons, in spring 2019 (**Figure 16**).

Reproductive status

The mean reproductive status, as recorded by flowering status, of tagged indicator species, shows that across all species and seasons flowering has generally been low (**Figure 11** to **Figure 16**). The

infrequent recording of flowering plants of indicator species across the entire survey period is thought to be related to the timing of surveys not coinciding with peak flowering periods.

Within valley side swamps supporting Restioid Heath / Banksia Thicket the mean reproductive status of tagged indicator species has been variable between seasons and also between longwall and control sites in individual seasons (**Figure 11**, **Figure 12** and **Figure 13**). Generally, where differences were observed, as indicated by non-overlapping error bars, the scale of these differences were small (less than 1) although larger differences were observed for selected species in individual seasons. As with most previous spring monitoring seasons, in spring 2019 the mean reproductive status was higher than that recorded in autumn 2019 for all three indicator species in both longwall and control sites. In spring 2019, the mean reproductive status of tagged indicator species within Restioid Heath / Banksia Thicket swamps was similar at longwall and control swamps for *Epacris obtusifolia* and *Sprengelia incarnata* individuals. Mean reproductive status of *Pultenaea aristata* individuals was greater at longwall sites than control sites, although minimal flowering was recorded for all three species (**Figure 11**, **Figure 12** and **Figure 13**).

Within Tea Tree Thicket swamps, mean reproductive status has been similar between longwall and control sites across all seasons, though differences, as indicated by non-overlapping error bars, have been observed in individual seasons (e.g. *Banksia robur* in autumn 2011). In spring 2019, the mean reproductive status of tagged indicator species within Tea Tree Thicket swamps was similar at longwall and control sites for *Banksia robur*, *Callistemon citrinus* and *Leptospermum juniperinum*, with very minimal flowering recorded (**Figure 14**, **Figure 15** and **Figure 16**).

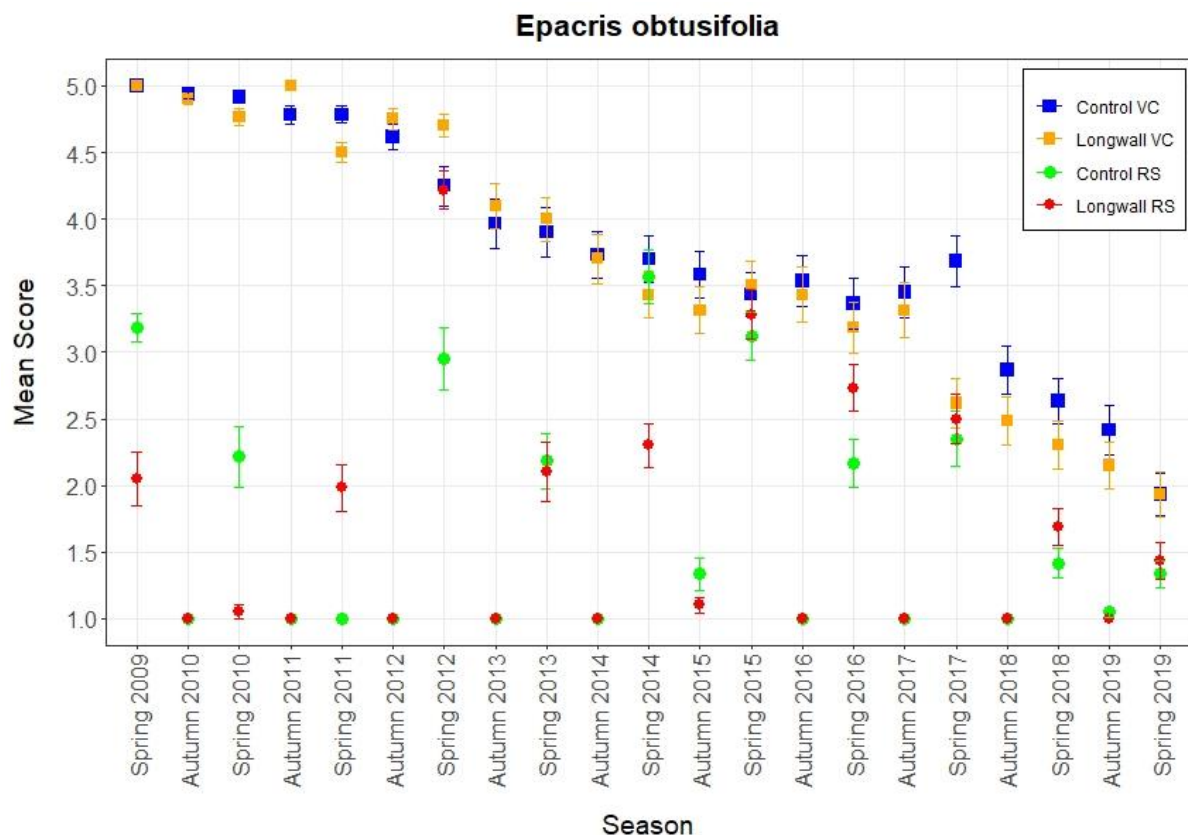


Figure 11: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Epacris obtusifolia* (spring 2009 to spring 2019).

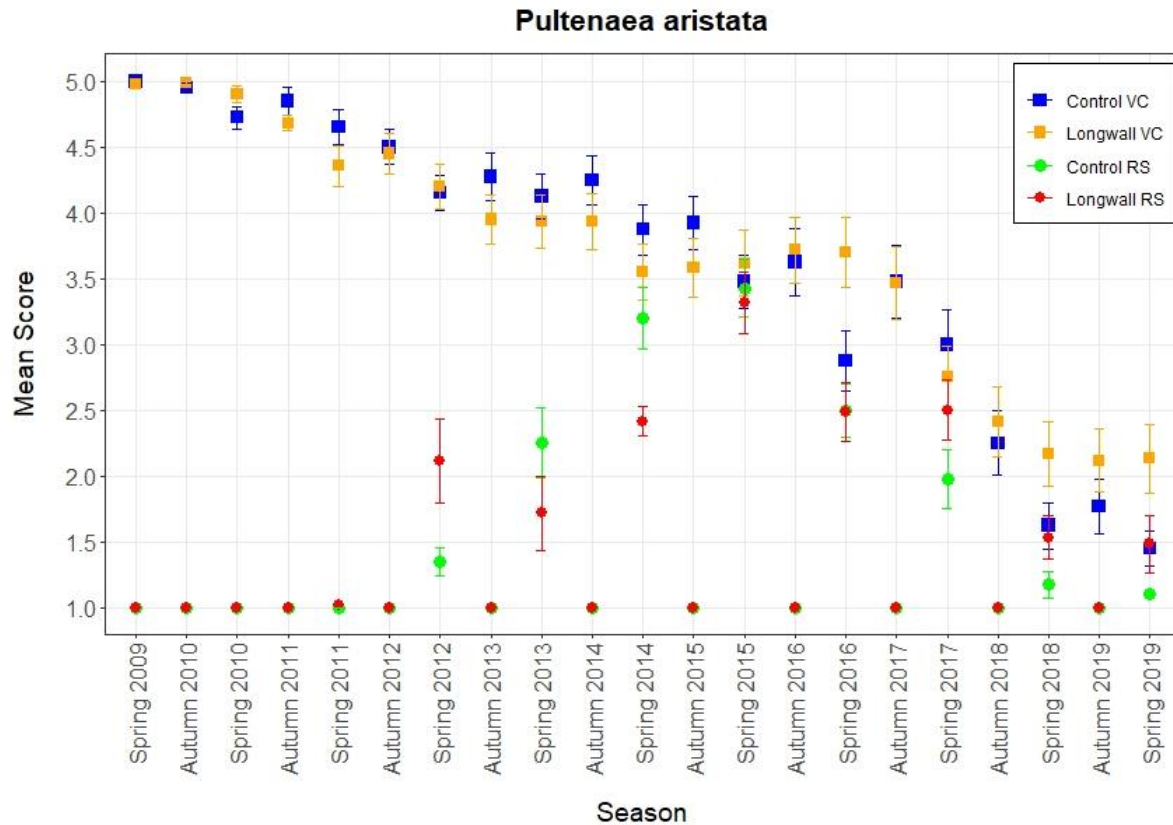


Figure 12: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Pultenaea aristata* (spring 2009 to spring 2019).

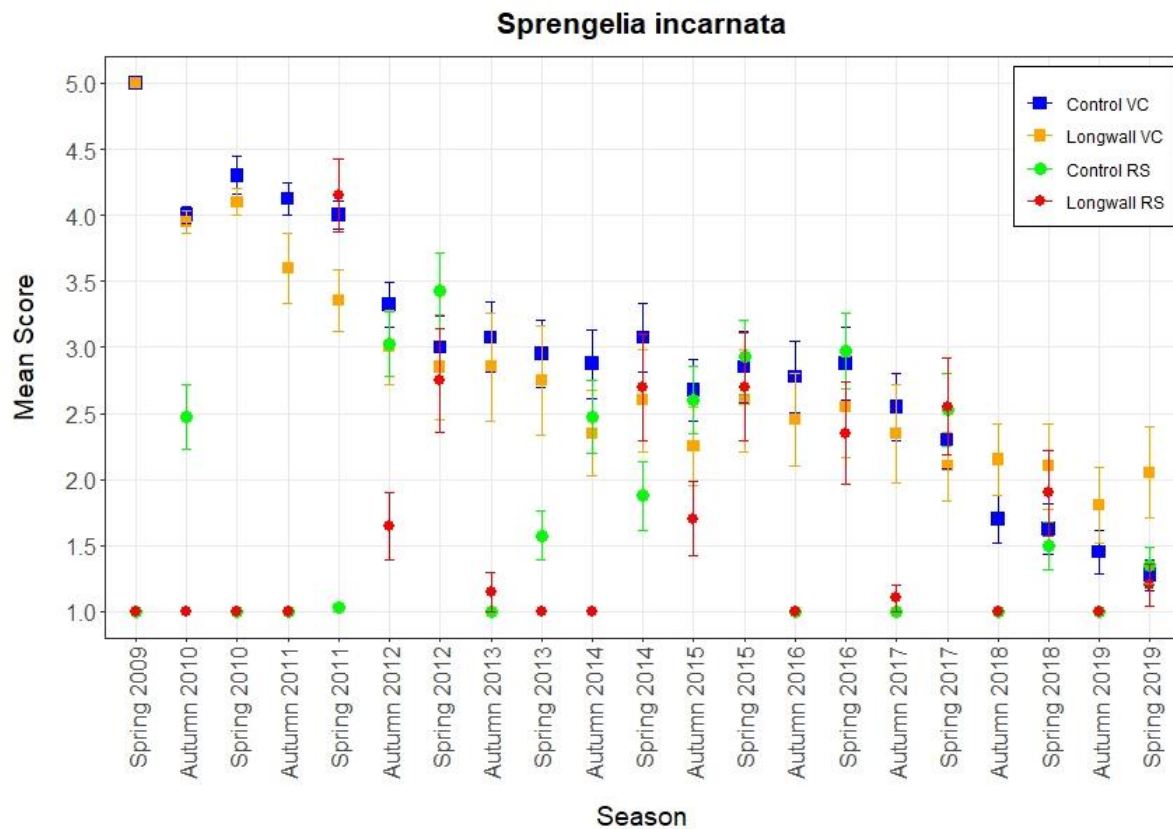


Figure 13: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Sprengelia incarnata* (spring 2009 to spring 2019).

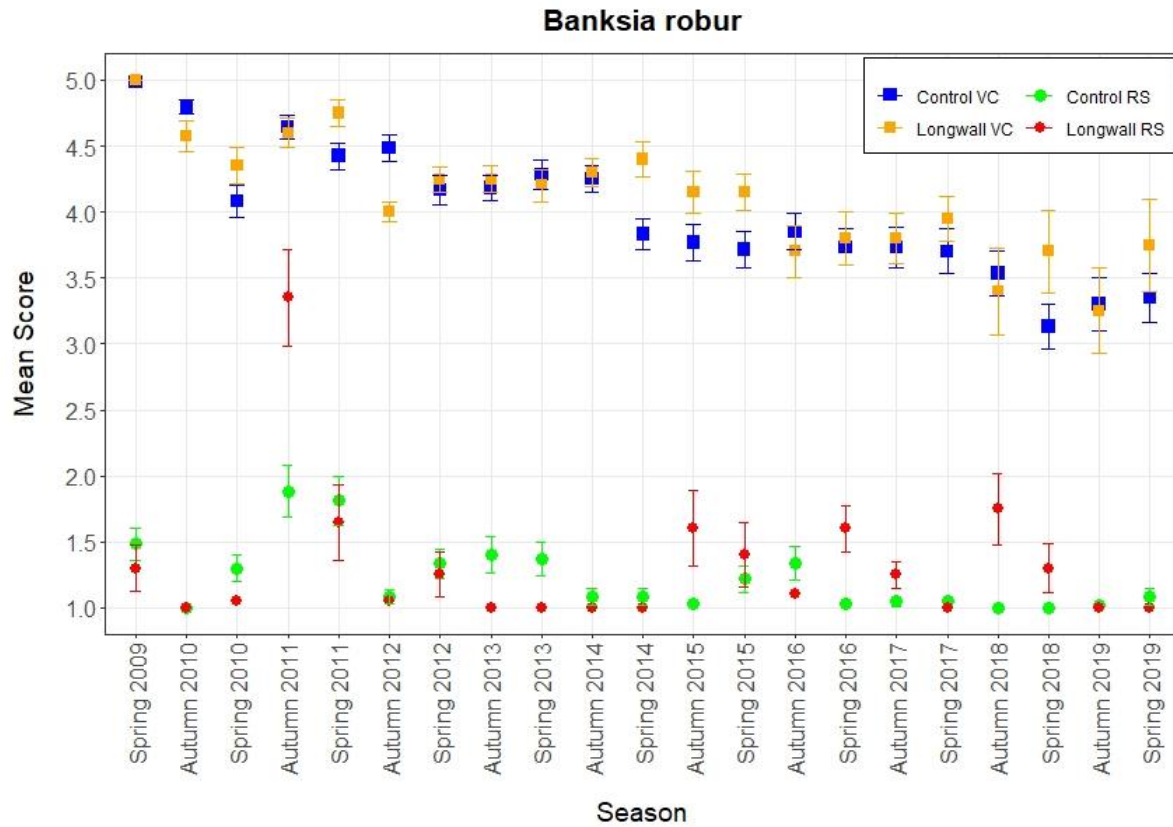


Figure 14: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Banksia robur* (spring 2009 to spring 2019).

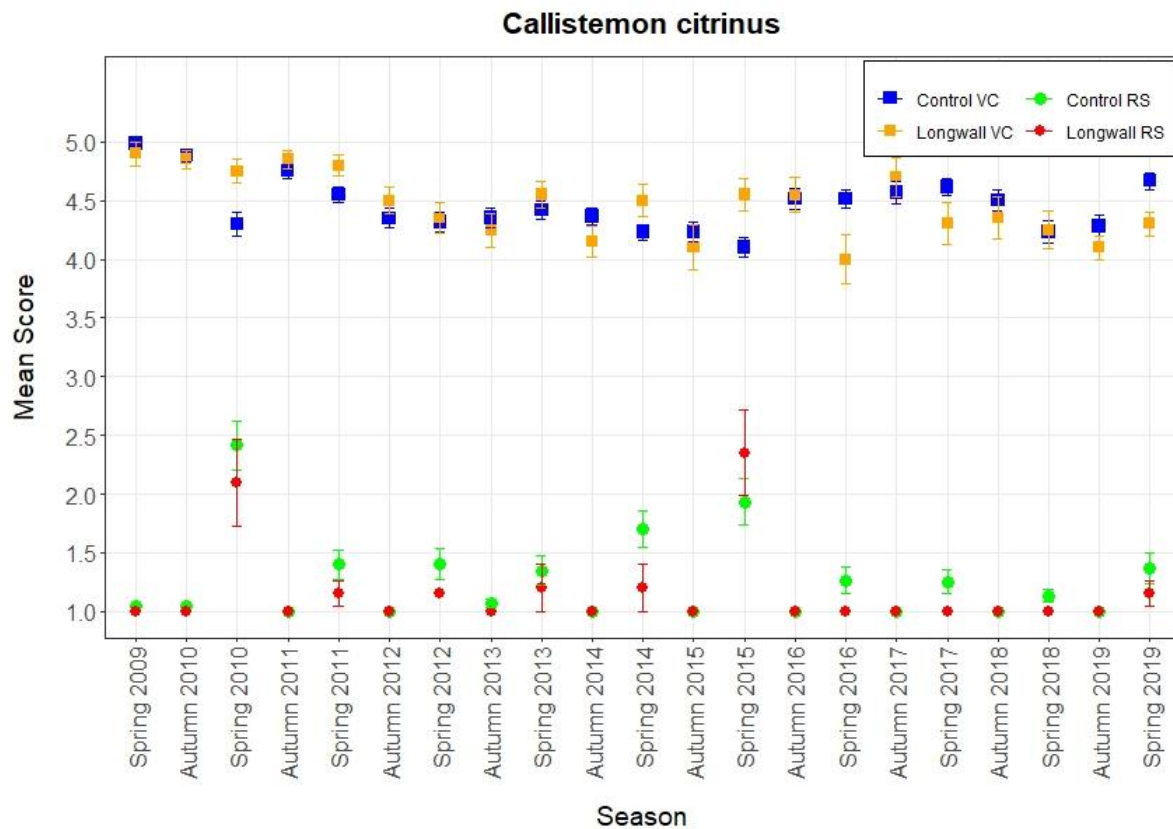


Figure 15: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Callistemon citrinus* (spring 2009 to spring 2019).

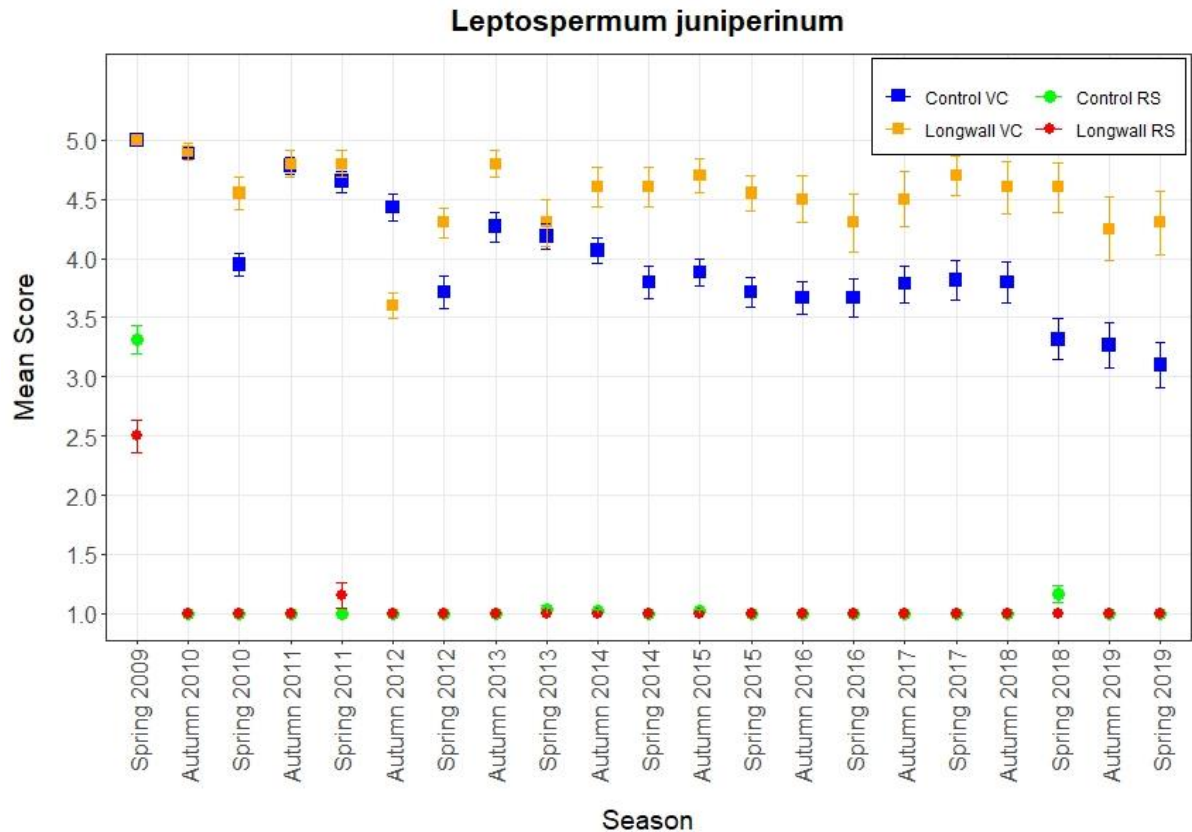


Figure 16: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Leptospermum juniperinum* (spring 2009 to spring 2019).

Proportion of plants surviving

In spring 2019, 184 of the tagged valley side swamp indicator species were recorded in Condition 1 (dead or with severe dieback), increasing from 172 individuals in autumn 2019. From autumn 2019 to spring 2019, 18 tagged indicator species individuals declined to Condition 1 after being in a healthier condition in autumn 2019, while six individuals recorded in Condition 1 in autumn 2019 were recorded in an improved condition in spring 2019.

The proportion of the total number of tagged individuals of each indicator species which have been recorded as dead (Condition 1) in each season is presented in **Figure 17**, **Figure 18** and **Figure 19**. In spring 2019 the proportion of valley side swamp indicator species which were dead was marginally higher at longwall sites than control sites for *Epacris obtusifolia*. The proportion of tagged *Pultenaea aristata* and *Sprengelia incarnata* individuals recorded in Condition 1 was greater at control sites than longwall sites.

The higher proportion of dead individuals of *Epacris obtusifolia* at longwall sites (0.6) compared to control sites (0.58) in spring 2019 is a trend which has been recorded since autumn 2015 (**Figure 17**). The increase in the proportion of dead individuals of *Epacris obtusifolia* at longwall sites from autumn 2019 to spring 2019 was similar in magnitude to that observed for longwall sites in previous monitoring intervals since spring 2015. The increase observed in control sites was greater than that observed at longwall in recent monitoring intervals, but wasn't as large as the increase recorded from spring 2018 to autumn 2019.

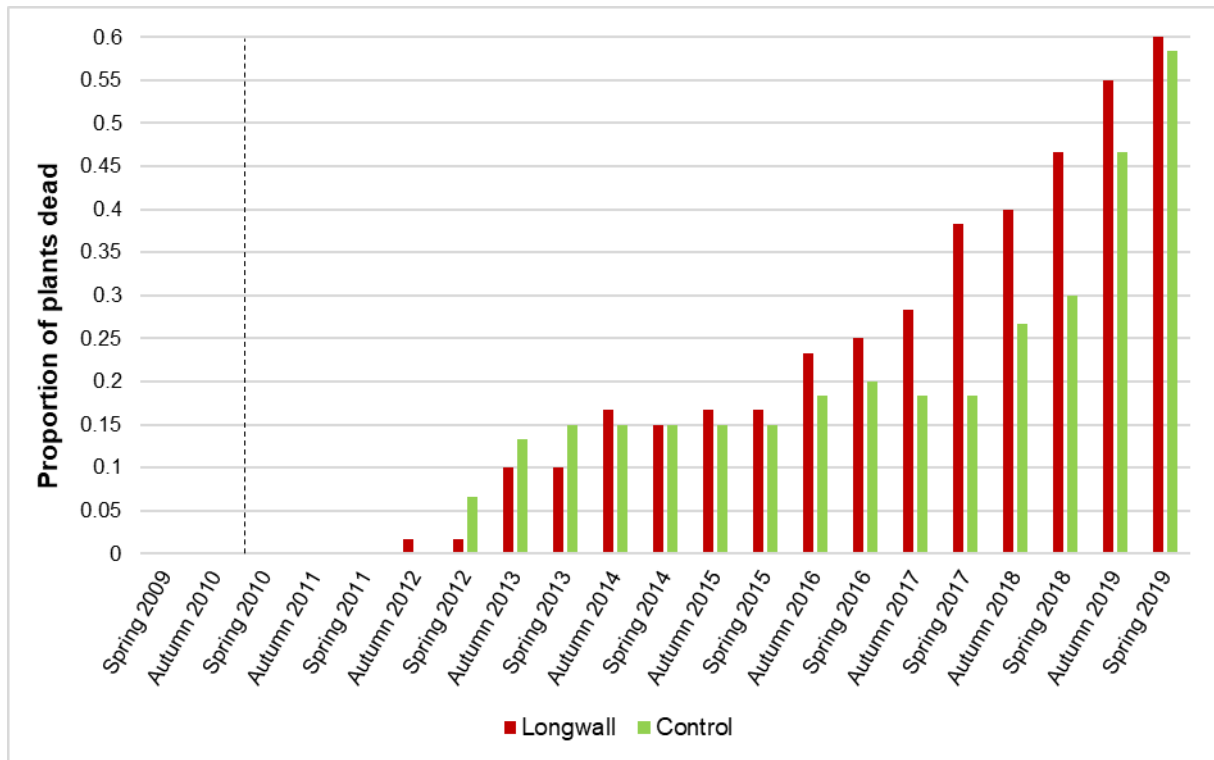


Figure 17: Proportion of tagged *Epacris obtusifolia* which have died at longwall and control valley side swamps (spring 2009 to spring 2019). Dashed line indicates change from baseline monitoring seasons to monitoring undertaken during and post mining of Longwalls 20 - 22.

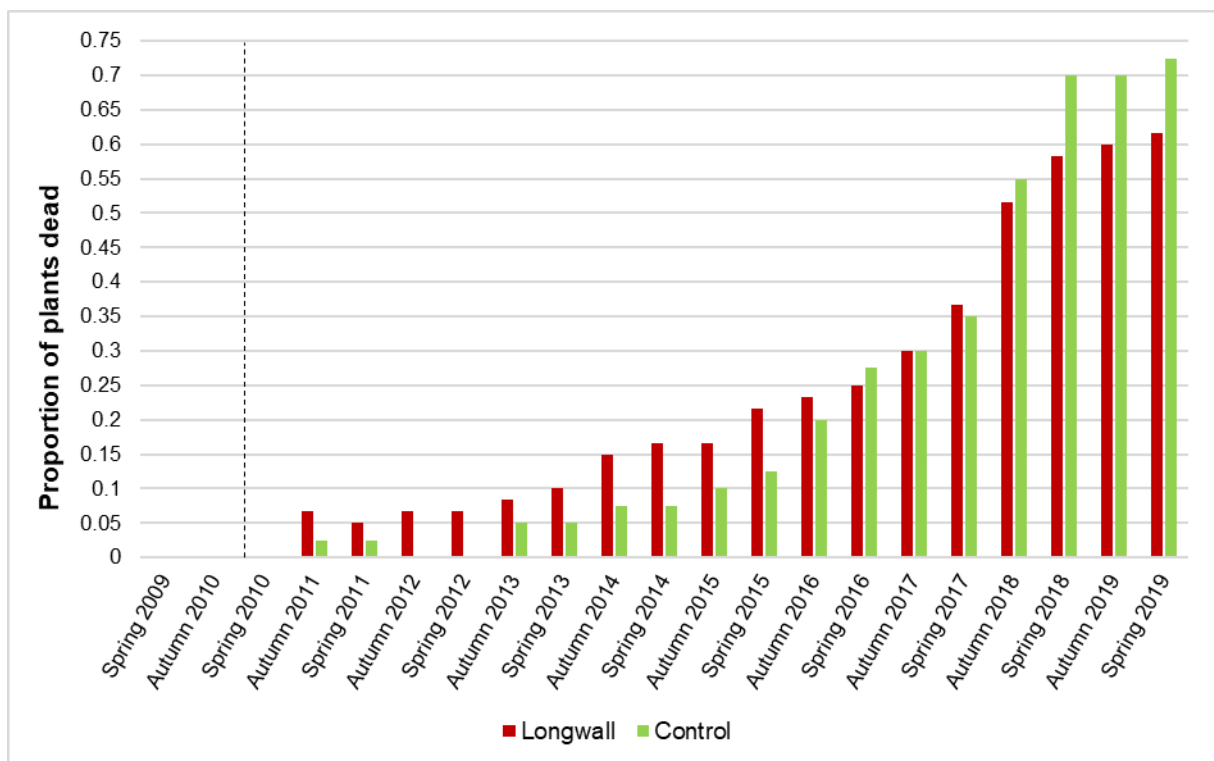


Figure 18: Proportion of tagged *Pultenaea aristata* which have died at longwall and control valley side swamps (spring 2009 to spring 2019). Dashed line indicates change from baseline monitoring seasons to monitoring undertaken during and post mining of Longwalls 20 - 22.

The higher proportion of dead individuals of *Pultenaea aristata* at control sites (0.73) compared to longwall sites (0.62) in spring 2019 is a result that has been recorded in the previous three surveys, as well as spring 2016 (**Figure 18**). The seasonal increase in the proportion dead for *Pultenaea aristata* has been reasonably consistent within longwall and control sites since autumn 2013, apart from the large increase recorded for both between spring 2017 and autumn 2018.

The higher proportion of dead individuals of *Sprengelia incarnata* at control sites (0.85) compared to longwall sites (0.65) in spring 2019 is a relatively new trend that has only been recorded since autumn 2018 (**Figure 19**). However, since the previous autumn 2019 survey period there was a slight decrease (0.05) at longwall sites and only a minor increase (0.02) at control sites, in the proportion dead for tagged *Sprengelia incarnata* individuals.

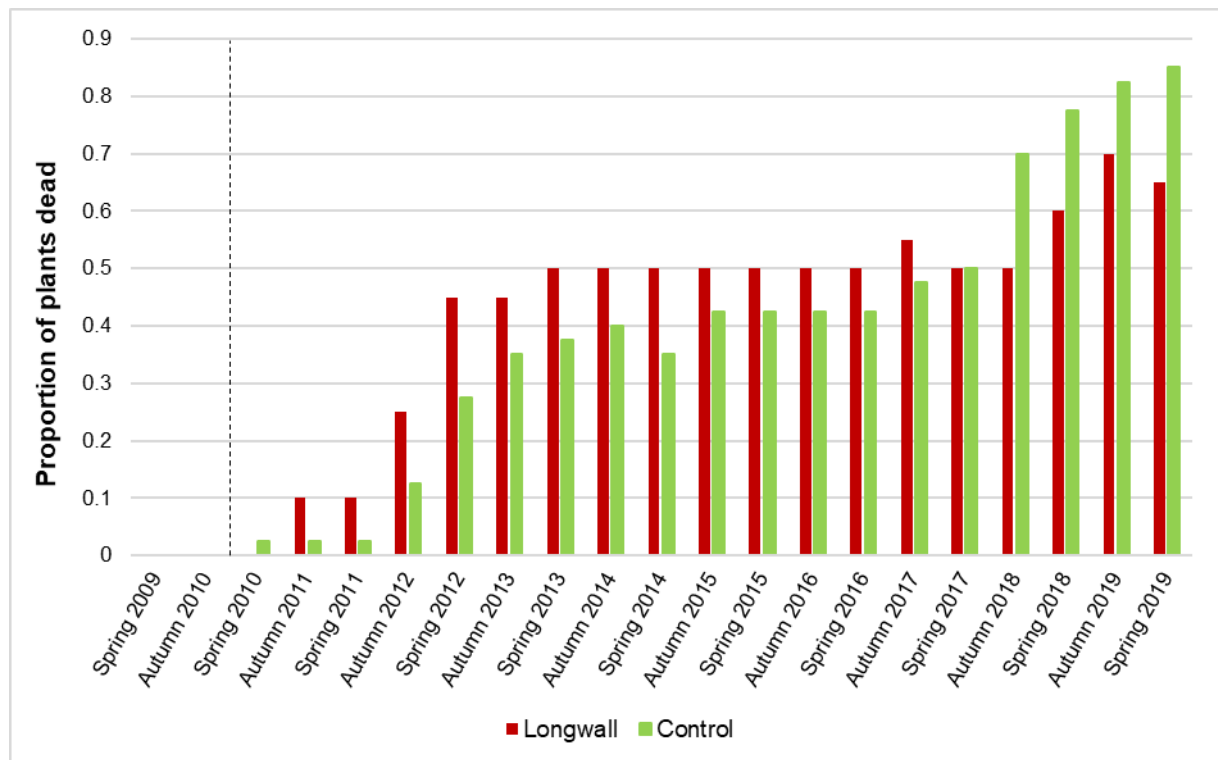


Figure 19: Proportion of tagged *Sprengelia incarnata* which have died at longwall and control valley side swamps (spring 2009 to spring 2019). Dashed line indicates change from baseline monitoring seasons to monitoring undertaken during and post mining of Longwalls 20 - 22.

Prior to the autumn 2018 season, the proportion of dead valley side swamp indicator species has generally been greater at longwall sites than control sites. This trend was reversed from autumn 2018 to the current season for *Pultenaea aristata* and *Sprengelia incarnata*, where the proportion dead has been greater in the control swamps than longwall swamps (**Figure 18** and **Figure 19**). Whilst the rate of increase in proportion dead for *Epacris obtusifolia* diverged between longwall and control swamps from autumn 2016 to spring 2017, this trend has ceased with the large seasonal increases in proportion dead in control sites from autumn 2018 to spring 2019 (**Figure 17**).

In Tea Tree Thicket swamps, 37 individuals of the tagged indicator species were recorded as Condition 1 (dead or with severe dieback) in spring 2019, decreasing from 39 individuals in autumn 2019. Of the 37 tagged indicator species recorded as Condition 1 in spring 2019, six individuals were within the single longwall swamp, Swamp 20 (four *Banksia robur* and two *Leptospermum juniperinum*) with 33 individuals (14 *Banksia robur* and 17 *Leptospermum juniperinum*) located within control sites. Due to the low levels of mortality of indicator species observed in Tea Tree Thicket swamps, further analysis was not

conducted. As the proportion of individuals in Condition 1 were greater within control swamps, the observed mortality is attributed to natural factors including predation, ageing plants, competition with other vegetation and abiotic factors.

3.1.4 Assessment against performance indicators

In accordance with the Longwall 304 Biodiversity Management Plan, the visual observations, quadrat monitoring and indicator species monitoring results are used to assess the upland swamp vegetation performance indicator:

The vegetation in upland swamps is not expected to experience changes significantly different to changes in control swamps.

The visual observations, transect/quadrat and indicator species monitoring results are described in **Sections 3.1.1 to 3.1.3** above.

The upland swamp vegetation Trigger Action Response Plan (TARP) from the Longwall 304 Biodiversity Management Plan is provided in **Appendix C**. A summary of the results in relation to the upland swamp vegetation TARP is provided in **Table 10**.

Table 10: Summary of Upland Swamp Vegetation Monitoring against Trigger Action Response Plan.

Performance Indicator	Monitoring Sites	Baseline	Significance Levels/ Triggers		Spring 2019 Monitoring Results	Action / Response	Comments
The vegetation in upland swamps is not expected to experience changes significantly different to vegetation in control swamps	- Swamps 16, 17, 18, 20, 24 and 25 overlying or adjacent to Longwalls 20-22. - Control Swamps 101, 111a, 125, Woronora River 1, Woronora River south arm and Dahlia Swamp.	Longwalls 20-22 swamps, as detailed in the LW20-22 vegetation monitoring report for the spring 2008 to autumn 2010 surveys¹.	Level 1	Data analysis indicates: - there is not a declining trend in the condition of longwall swamp vegetation; and - there are no significant changes in vegetation between the mined and control swamps.	Swamps 16, 17, 18, 20, 24 and 25	Continue monitoring. Six monthly reporting.	The declining trend in the condition of longwall swamp vegetation previously recorded by vegetation monitoring in spring 2017 and autumn 2018 for Swamps 16, 17, 18, 24 and 25 has stabilised for the third survey season and recovery in the form of new growth on many of the impacted species was apparent in spring 2019. Dieback of <i>Gleichenia</i> spp. across Swamp 20 has ceased and signs of recovery (regrowth) were observed.
			Level 2	Data analysis indicates: - there is a declining trend in the condition of longwall swamp vegetation over time, however a similar trend is occurring in control swamp vegetation; or - there are significant differences in vegetation between the mined and control swamps, however, the data indicates longwall swamp vegetation is consistent with the baseline monitoring results.	–	Consider swamp groundwater monitoring data. Six monthly reporting.	–
			Level 3	Data analysis indicates: - there is a declining trend in the condition of longwall swamp vegetation over time that is not occurring in control swamp vegetation; or - there are significant differences in vegetation between the mined and control swamps, and the data indicates longwall swamp vegetation is not consistent with the baseline monitoring results.	–	Consider swamp groundwater monitoring data. Initiate assessment against the performance measure ² . Consider the need for management measures, in accordance with Sections 8 and 9.	–

¹ Eco Logical Australia (2010) *Metropolitan Coal Vegetation Monitoring, Longwalls 20-22 – Baseline Data*. Report prepared for Metropolitan Coal.

² Threatened species, populations and ecological communities include those listed under the BC Act, EPBC Act or Fisheries Management Act at the time of Project Approval (i.e. the lists current as at 22 June 2009).

3.2 Riparian vegetation monitoring

3.2.1 Visual inspections

Visual inspections of riparian areas have been conducted in locations adjacent to riparian vegetation monitoring sites (i.e. sites MRIP01 to MRIP10) and areas traversed whilst accessing the monitoring sites.

Sites MRIP01, MRIP02, MRIP03, MRIP04 and MRIP10 on the Waratah Rivulet were surveyed in late October, following above average rainfall in September 2019. These surveys followed an extended dry period from July 2017 onwards, during which monthly rainfall was well below average, apart from October and November 2018 and March and September 2019, during which it rose slightly above average. Water levels at all Waratah Rivulet monitoring sites, both longwall (MRIP01 and MRIP02) and control (MRIP03, MRIP04 and MRIP10), were similar to the previous autumn 2019 surveys when water levels were slightly lower than the previous season. The water appeared cloudy with depth at long wall sites and at control site MRIP03, while it was clear at the other control sites. Despite low levels, the water was present and flowing at all Waratah Rivulet monitoring sites. Iron-stained floc was observed at both longwall sites, as well as on the rocks around the waterfall at control site MRIP04 (Photo Point 4a). Minor iron-stained seepage was recorded in sand adjacent to the waterfall (Photo Point 1a) at MRIP01 and along the rock bar below Pool N at MRIP02.

Sites MRIP05, MRIP06, MRIP07, MRIP08 and MRIP09 on the Eastern Tributary were surveyed in late October and mid-November, following the extended period of mostly below average monthly rainfall. Overall, water levels at all Eastern Tributary monitoring sites were higher than during the previous autumn 2019 survey period. In both the spring 2017 and autumn 2018 surveys, water levels were generally low across all Eastern Tributary sites, with no water observed at MRIP06, very low water levels at MRIP05 and only minor flow at MRIP09 in autumn 2018. In the spring 2018 survey, water flow was present and continuous. During the previous autumn 2019 survey, no water was observed in MRIP06, was limited to small rock pools at MRIP05, and occurred at very low levels in MRIP09, with no surface flow between these three sites. In the current spring 2019 survey, water was present and flowing slowly at all sites on the Eastern Tributary, although surface flow was not continuous between all sites. Water levels in spring 2019 were similar or slightly below those observed in spring 2018. The pool at MRIP05 (ETJ) had been dry in spring 2016, full in autumn 2017, low with no water flow downstream until spring 2018, however it was completely dry in the previous autumn 2019 survey. In the current spring 2019 survey, water was again observed at this pool (**Plate 2**).

Prior to the autumn 2017 survey, mine subsidence impacts to pool drainage behaviour were recorded by Metropolitan Coal (Metropolitan Coal, 2017) at sites MRIP07 and MRIP08⁵. There was little water flow at site MRIP07 and downstream through site MRIP08 during the autumn 2017 and spring 2017 surveys, whilst water flow was present at low levels at both sites in autumn 2018. Water flow was again present in the spring 2018 survey, with water levels high following above average rainfall. During the previous autumn 2019 survey there was no water present at MRIP07 and very low water levels at MRIP08, resulting in minimal downstream water flow. In the current spring 2019 survey, low water levels were present at both MRIP07 and MRIP08 (**Plate 3** and **Plate 4**). Water at both sites appeared cloudy, yellow-brown in colour and contained floc.

⁵ Riparian vegetation monitoring sites MRIP07 and MRIP08 were used as control sites for comparison against the longwall riparian monitoring sites prior to subsidence impacts occurring to pools on the Eastern Tributary at these sites post spring 2016 and before autumn 2017. Analyses from autumn 2017 onwards no longer considers these sites as control sites.

All riparian sites were subject to high water flows in March 2017, resulting in impacts including flood-swept and prone vegetation, loss of individual plants, burial of vegetation by adjacent vegetation, and burial by woody flood debris and sediment. The impacts were evident across all sites. The extent of bank scouring was often associated with sandy areas where vegetation was lost during high water flows (MRIP02, MRIP05 and MRIP09). Areas of sediment deposition were observed along both the Waratah Rivulet and the Eastern Tributary. The impacts of this event remain evident across all riparian monitoring sites in spring 2019, including scouring of stream banks and erosion of sediments. However, many previously impacted sites are showing significant recovery, including the development of a good covering of shrubs and sedges (**Plate 5**).

Vegetation was generally observed in good condition across and adjacent to the riparian monitoring sites. Exceptions to the generally good condition of riparian vegetation include the following:

- Plants recorded with dieback throughout all riparian sites tended to be isolated to a few individuals scattered throughout the sites and included the shrubs *Acacia longifolia* subsp. *longifolia*, *Allocasuarina littoralis*, *Banksia ericifolia* subsp. *ericifolia*, *Hakea teretifolia* and *Tristania neriifolia*.
- Vegetation along Waratah Rivulet at longwall site MRIP01 was generally found in good condition. Exceptions to this were the occasional occurrence of dieback in scattered individuals of the shrubs *Acacia longifolia* subsp. *longifolia* and *Banksia ericifolia* subsp. *ericifolia*.
- Within longwall site MRIP02, along Waratah Rivulet, riparian vegetation was in a similar condition in spring 2019 to that observed in autumn 2019, when vegetation was in an overall improved condition compared to previous seasons. Patches of dead *Pteridium esculentum* were still apparent, particularly from Photo Point 1 (**Plate 6** and **Plate 7**), however new growth was recorded amongst the dieback. At Photo Point B a new area of *Pteridium esculentum* dieback was recorded on the eastern bank, while dead individuals of *Acacia longifolia* subsp. *longifolia*, *Allocasuarina littoralis* and *Dodonaea triquetra* were observed on the opposite bank, however dieback at this site did not exceed 50 cm from top of bank (**Plate 8**). Dieback was initially recorded at longwall site MRIP02 during spring 2012 and remained evident up to autumn 2017. In spring 2017, vegetation along both sides of the Waratah Rivulet was observed in an improved condition compared to previous surveys and regeneration was common. In autumn 2018, extensive areas of vegetation dieback were recorded on both sides of the Waratah Rivulet, with patches of dead *Gleichenia microphylla* and *Pteridium esculentum* occurring greater than 50 cm from the top of bank. Past observations of vegetation dieback and loss at this site were due to previous flood events and areas of prone vegetation are still evident.
- At longwall sites MRIP05 and MRIP06, along the Eastern Tributary, dieback of groundcover and shrub layer vegetation has been previously recorded along a discontinuous band, immediately adjacent to the water's edge (i.e. along the top of bank). As detailed in previous reports (Eco Logical 2019b), vegetation condition at MRIP05 and MRIP06 has fluctuated between dieback and recovery since spring 2013, affecting both ground layer and shrub species, in particular *Bauera rubioides*, *Gleichenia microphylla*, *Schoenus melanostachys* and *Sporadanthus gracilis*. In autumn 2018, dieback was greater than 50 cm from top of bank in some areas at both sites, whilst in spring 2018 it appeared improved, with regrowth occurring within these patches. In the current spring 2019 survey, minor regrowth of *Gleichenia microphylla* was observed at Photo Point 4a (**Plate 9**), where dieback greater than 50 cm from top of bank was observed in autumn 2019, above the pool ETJ (**Plate 2**).
- At longwall site MRIP09, along the Eastern Tributary, vegetation was observed to be in a good condition, similar to the previous autumn 2019 survey, with no dieback greater than 50 cm from top of bank recorded. New growth was observed at this site, particularly of *Gleichenia microphylla* (**Plate 10**). Dieback of shrubs and ground layer plants has been observed in this location since spring 2013, extending throughout 2014 and showing signs of improvement in the condition of

groundcover species in autumn 2015 (Eco Logical 2018b). Further dieback of groundcover and shrub layer vegetation was observed in autumn 2018 along a discontinuous band immediately adjacent to the water's edge (i.e. the top of bank) at the lower end of MRIP09 (Photo Point 2) and extending discontinuously downstream to MRIP05. The extent of this dieback had not increased between autumn 2018 and spring 2019. Regeneration of shrub species within this area has been observed from 2016 to the current spring 2019 survey.

Observations of cracking or rock displacement at the riparian monitoring sites are summarised below:

- No new areas of bedrock cracking were observed within longwall sites MRIP01, MRIP02, MRIP05, MRIP06 and MRIP09 in spring 2019.
- Cracking of streamside rocky areas at the downstream end of MRIP01, and further downstream between MRIP01 and MRIP02, was first observed during surveys between autumn 2011 and 2012. Since this time, cracking has been observed to increase and pieces of cracked bedrock at these sites have been transported downstream by higher water flows. Cracking and bedrock movement did not change between the spring 2017 and the current spring 2019 survey.
- Fine hairline cracking of bedrock was observed for the first time at MRIP04 in spring 2019, on the eastern bank below a small scarp (Photo Point 6).
- Cracking of bedrock was observed for the first time at MRIP05 in autumn 2016, at the pool below Photo Point 5 (between sites MRIP05 and MRIP06). In autumn 2017, further cracking was recorded across the rock bar just upstream of the pool, extending across the width of the rock bar, and a second crack was recorded approximately 1 m upstream. In subsequent surveys, including the current spring 2019 survey, previously recorded cracks at this site appeared unchanged (**Plate 12**).
- Cracking of a small exposed rocky outcrop at the start of MRIP06 was recorded for the first time in the autumn 2018 survey. In the current spring 2019 survey, cracking of a rock located along the track between Photo Point 6 and Photo Point 7 was observed for the first time at this site.
- Along the Eastern Tributary at site MRIP07 a new area of in-stream bedrock cracking was recorded for the first time in autumn 2017 at Photo Point 2c, resulting in little water flow at this site and downstream to MRIP08. At this time cracking was also observed at Photo Point 4, just upstream of site MRIP08. In autumn 2018 an additional small crack was recorded within MRIP07 at Photo Point 1. In the previous autumn 2019 survey, additional hairline cracks were observed for the first time in MRIP08 at Photo Point 1 and Photo Point 4 (**Plate 11**). In the current spring 2019 survey, fragments of cracked rock at Photo Point 4 are missing, presumed to have been washed down stream. Bedrock displacement has not been observed at either MRIP07 or MRIP08.
- Across all observations, including sites MRIP07 and MRIP08, no impacts to adjacent vegetation were observed in association with any of the observed bedrock cracking.

Four introduced species were observed in riparian monitoring sites: *Andropogon virginicus* (Whiskey Grass) (MRIP02, MRIP03 and MRIP10), *Conyza* sp., (Fleabane) (MRIP01 and MRIP02), *Gamochaeta* sp. (Cudweed) (MRIP02 and MRIP04) and *Senecio madagascariensis* (Fireweed) (MRIP02). No introduced aquatic species have been recorded in streams adjacent to the riparian monitoring sites.



Plate 2: Eastern Tributary, adjacent to MRIP05, with water in the pool – spring 2019.



Plate 3: Eastern Tributary, MRIP07, Photo Point 2C, downstream view – spring 2019.



Plate 4: Eastern Tributary, MRIP08, Photo Point 4, upstream view – spring 2019.



Plate 5: Waratah Rivulet MRIP02 area of previous flood impacts – spring 2019.



Plate 6: Eastern bank of Waratah Rivulet MRIP02, Photo Point 1 view upstream – spring 2019.



Plate 7: Eastern bank of Waratah Rivulet MRIP02, Photo Point 1 view downstream – spring 2019.



Plate 8: Eastern bank of Waratah Rivulet MRIP02, Photo Point B view downstream – spring 2019.



Plate 9: Eastern Tributary MRIP05, Photo Point 4a west bank – spring 2019.



Plate 10: Eastern Tributary MRIP09, Photo Point 3 view upstream – spring 2019.



Plate 11: Eastern Tributary, MRIP08, Photo Point 4, cracking – spring 2019.



Plate 12: Eastern Tributary cracking across rock bar between sites MRIP05 and MRIP06 – spring 2019.

3.2.2 Quadrat monitoring

Prior to the autumn 2017 survey, mine subsidence impacts to pool drainage behaviour were recorded by Metropolitan Coal at sites MRIP07 and MRIP08, downstream of Longwall 27 (Metropolitan Coal 2017). Prior to the impacts occurring, sites MRIP07 and MRIP08 were used as control sites for comparison against the longwall riparian monitoring sites. Analyses from autumn 2017 on will no longer consider these sites as control sites (consistent with the Longwall 304 Biodiversity Management Plan).

Vegetation structure, dominant species and estimated cover for each stratum

The vegetation structure, dominant species and estimated cover for each stratum at riparian monitoring sites is provided in **Appendix G**.

In spring 2019, the percent cover and height of the structural layers was generally similar to that recorded for autumn 2019. Across all seasons (since the surveys commenced in spring 2008), the vegetation structure, dominant species and estimated cover for each stratum has varied between sites and between seasons within sites. Results have generally fluctuated with no clear trends in vegetation height or cover across sites. Following a decrease in the cover of mid-storey at a number of sites in autumn 2019, in the current spring 2019 survey, an increase in mid-storey was observed ranging from 10 – 20% (MRIP01, MRIP02 and MRIP08) to 40% (MRIP05). At five sites, the cover of the lower-storey decreased between 4 and 20% (MRIP02, MRIP04, MRIP05, MRIP06 and MRIP07). At MRIP02, which has previously recorded large declines in cover of the lower-storey, cover decreased from 30% in autumn 2019 to 25% in spring 2019. These trends, and the fluctuations observed in other sites, are considered to reflect both the natural variations in the height and cover of vegetation structural layers through time (including in response to flooding impacts), as well as the subjective nature of the data collection.

At MRIP02, cover of understorey was greater than 60% in all seasons up to and including spring 2012, with cover recorded at less than 50% in all seasons after spring 2012, including cover of 15% in spring 2016. This reduction in cover has occurred in conjunction with observations of dieback as discussed in **Section 3.2.1** and a shift in dominant species of the ground layer. This is considered to be attributable to the water loss experienced at this site in spring 2012 and altered water levels observed after this time, including periods where the vegetation at site MRIP02 has been submerged or inundated. In spring 2017, cover of the understorey increased to 50% from 45% in autumn 2017, with a shift in dominant ground cover species from largely *Sticherus flabellatus* var. *flabellatus*, *Gleichenia microphylla* and *Bauera rubioides* to *S. flabellatus* var. *flabellatus* and *Bauera rubioides*, which have been recorded as dominant in previous seasons. A decrease in cover to 20% was recorded in autumn 2018, with extensive areas both sides of the creek observed with dead *Gleichenia microphylla* and *Pteridium esculentum* in the lower storey. Cover of the lower storey increased to 40% in the spring 2018 survey, with *Sticherus flabellatus* var. *flabellatus*, *Gleichenia microphylla* and *Bauera rubioides* again considered most dominant, however a small decline in cover was observed in the previous autumn 2019 to 30%. In the current spring 2019 survey, cover of the lower storey continued to decline to 25%, with dominant species returning to *Sticherus flabellatus* var. *flabellatus*, *Gleichenia microphylla* and *Bauera rubioides*.

Species richness

A summary of species richness within riparian monitoring sites since spring 2008 is provided in **Table 11** and **Figure 20**. The raw data for each riparian monitoring site is presented in **Appendix G**.

As previously reported, with the exception of longwall site MRIP01 in spring 2010 and control site MRIP04 in autumn 2010, species richness was higher at all sites during the period spring 2008 – spring 2009 than during the period autumn 2010 – spring 2019 (**Table 11** and **Figure 20**). The marked decline in species richness in autumn 2010 occurred at both longwall sites (MRIP01, MRIP02, MRIP05 and MRIP06) and

control sites (MRIP03, MRIP04, MRIP07 and MRIP08⁶), although the trend is less consistent at control sites. The decline coincides with a change from a period of drier conditions (spring 2008 – spring 2009) to wetter conditions. Floods and high-water flows have occurred in the wetter seasons since autumn 2010 (see **Table 2**).

In spring 2019, species richness within riparian monitoring sites was generally similar to previous seasons with all values falling within the range observed across previous seasons for individual sites. At longwall riparian monitoring sites, a moderate to large increase in species richness was observed at two sites (MRIP05 and MRIP06) in spring 2019, when compared to autumn 2019, whilst a small decline in species richness was recorded at two sites (MRIP01 and MRIP02). At control riparian monitoring sites, a small decrease in species richness was observed at one site (MRIP04) in spring 2019, when compared with autumn 2019, whilst no change occurred at the other site (MRIP03). A moderate increase occurred at both of the control (compromised) sites (MRIP07 and MRIP08) in spring 2019.

Across the entire monitoring period (spring 2008 – spring 2019), an overall decrease in species richness has been observed in both longwall and control monitoring sites. This trend, however, appears to be reversing for a number of control and longwall sites, with increases in species richness observed since autumn 2017 (MRIP04, MRIP06, MRIP07), spring 2017 (MRIP02) and autumn 2018 (MRIP01). As these trends have been observed across control sites and longwall sites, these changes are considered to be in response to climate, population dynamics and natural disturbances including flood and drought.

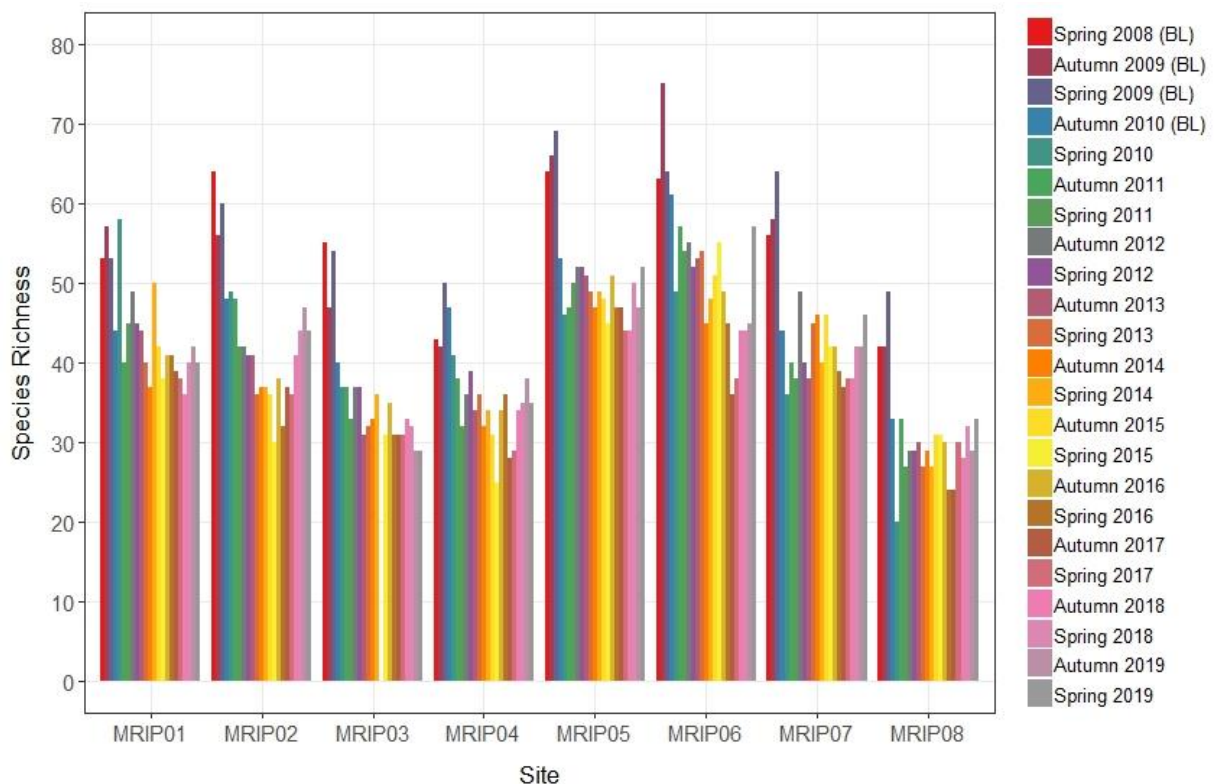


Figure 20: Native species richness within riparian monitoring sites across all seasons, spring 2008 to spring 2019, BL = baseline.

⁶ Riparian vegetation monitoring sites MRIP07 and MRIP08 were used as control sites for comparison against the longwall riparian monitoring sites prior to subsidence impacts occurring to pools on the Eastern Tributary at these sites post spring 2016 and before autumn 2017. Analyses from autumn 2017 onwards no longer considers these sites as control sites.

Table 11: Number of native species recorded in riparian sites across all seasons (spring 2008 to spring 2019).

Site	Spring 2008	Autumn 2009	Spring 2009	Autumn 2010	Spring 2010	Autumn 2011	Spring 2011	Autumn 2012	Spring 2012	Autumn 2013	Spring 2013	Autumn 2014	Spring 2014	Autumn 2015	Spring 2015	Autumn 2016	Spring 2016	Autumn 2017	Spring 2017	Autumn 2018	Spring 2018	Autumn 2019	Spring 2019
Longwall sites*																							
MRIP01	53	57 (1)	53	44 (1)	58 (1)	40	45	49	45	44	40	37	50	42	38	41	41	39	38	36 (2)	40	42	40
MRIP02	64	56	60	48	49	48	42	42	41	41	36	37	37	36	30	38 (1)	32 (1)	37 (1)	36	41 (1)	44	47 (1)	44 (1)
MRIP05	64	66	69	53	46	47	50	52	52	51	49	47	49	48	45	51	47	47	44	44	50	47	52
MRIP06	63	75	64 (1)	61	49	57	54	55	52	53	54	45	48	51	55	49	45	36	38	44	44	45	57
MRIP07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	37	38	38	42	42	46
MRIP08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	24	30	28	32	29	33
Control sites*																							
MRIP03	55	47	54	40 (2)	37	37	33	37	37	31	32	33	36	-	31	35	31	31	31	33	32	29	29
MRIP04	43	42 (1)	50	47	41	38	32	36	39	34	36	32	34	31	25	34	36	28 (1)	30	34	35	38	35
MRIP07	56	58	64	44	36	40	38	49	40	38	45	46	40	46	42	42	39	N/A	N/A	N/A	N/A	N/A	N/A
MRIP08	42	42	49	33	20	33	27	29	29 (1)	30	27	29	27	31	31	30	24	N/A	N/A	N/A	N/A	N/A	N/A

NB: numbers in brackets indicate the number of exotic species recorded in addition to native species

* Riparian vegetation monitoring sites MRIP07 and MRIP08 were used as control sites for comparison against the longwall riparian monitoring sites prior to subsidence impacts occurring to pools on the Eastern Tributary at these sites post spring 2016 and before autumn 2017. Analyses from autumn 2017 onwards no longer considers these sites as control sites.

Cover/abundance and condition

The cover/abundance and condition ratings for each species are provided in **Appendix G**.

Cover/abundance

Fluctuations in species cover/abundance were recorded across all sites and all seasons. In spring 2019, no patterns of increasing or decreasing cover/abundance were identified in relation to individual species across sites or groups of species (i.e. riparian species, generalist species, shrubs, ground covers) within sites, with the exception of sites MRIP02, MRIP05, MRIP06 and MRIP09 where dieback of streamside vegetation has been recorded along the edge of the stream to varying degrees. For most riparian sites ground layer species are dominated by *Bauera rubioides*, *Gleichenia microphylla*, *Schoenus melanostachys* and *Sticherus flabellatus* var. *flabellatus*.

The foliage cover of *Gleichenia microphylla* at site MRIP02 has been recorded under 5% in all seasons since dieback was first recorded in spring 2012, reducing from 21-50% cover for the three seasons prior to dieback being observed (i.e. autumn 2011, spring 2011, autumn 2012). In spring 2017, the cover of *Gleichenia microphylla* at MRIP02 increased to 5-20%. In autumn 2018 and spring 2018, *Gleichenia microphylla* was recorded in a reduced condition with a cover/abundance of less than 5%, where it remained in autumn 2019. The cover/abundance of *Sticherus flabellatus* var. *flabellatus* at this site has increased since autumn 2018, from 5-20% to 21-50%. In the current spring 2019 survey, *Gleichenia microphylla* increased to 5-20% at this site, while *Sticherus flabellatus* var. *flabellatus* remained between 21-50%.

Condition

The majority of species within all riparian monitoring quadrats at both longwall and control sites were recorded in a healthy condition (Condition 5) in spring 2019, including species at control (compromised) sites MRIP07 and MRIP08.

Observations of vegetation with dieback included occasional observations of plants with minor dieback (Condition 4) to some dead branches (Condition 3), or rarely severe dieback (Condition 1). In spring 2019, species for which dieback was observed at both longwall and control sites was limited to *Banksia ericifolia* subsp. *ericifolia*. While some species were recorded with dieback in longwall sites and in a healthy condition in control sites (*Cassytha glabella*, *Leptospermum morrisonii* and *Lomandra fluviatilis*) the majority of dieback observed for these species was only minor dieback (Condition 4) or rarely some dead branches (Condition 3). Three species were recorded with dieback in control sites and in a healthy condition in longwall sites (*Bauera rubioides*, *Gleichenia microphylla* and *Prostanthera linearis*).

3.2.3 Indicator Species

Indicator species monitoring data, including a condition/health rating and reproductive rating for each plant, are provided in **Appendix G**.

As noted in **Section 3.2.1** and **Section 3.2.2**, riparian control sites MRIP07 and MRIP08, located along the Eastern Tributary, were impacted by mine subsidence between spring 2016 and autumn 2017 and can no longer be used as control sites. However, indicator species monitoring at MRIP07 and MRIP08 will continue.

Indicator species monitoring results at longwall sites MRIP01, MRIP02, MRIP05, MRIP06 and MRIP09 have been analysed and assessed against control sites MRIP03, MRIP04 and MRIP10. The results for sites MRIP07 and MRIP08 are discussed separately.

Condition scale

Overall, mean vegetation condition has decreased over the entire survey period for the three riparian indicator species, *Lomatia myricoides*, *Prostanthera linearis* and *Schoenus melanostachys*, within both longwall and control sites, with the level of decline greatest for *Prostanthera linearis* and only a minor decline observed for *Lomatia myricoides* (**Figure 21**, **Figure 22** and **Figure 23**). The mean vegetation condition for tagged riparian indicator species *Lomatia myricoides* was similar between longwall and control sites throughout the baseline period and all seasons until spring 2012, after which the mean vegetation condition at control sites remained relatively high and consistent across seasons, whilst it was more variable for longwall sites but generally lower than control sites (**Figure 21**). The mean vegetation condition for tagged riparian indicator species *Prostanthera linearis* has been similar between longwall and control sites across most seasons (**Figure 22**). Mean vegetation condition has been variable between longwall and control sites for *Schoenus melanostachys* over the entire survey period (**Figure 23**).

In spring 2019, the mean vegetation condition of *Lomatia myricoides* was higher at control sites compared to longwall sites (**Figure 21**). At longwall sites, mean vegetation condition remained similar to the previous three seasons, when mean vegetation condition decreased below the previously recorded range. In spring 2019, mean vegetation condition of *Lomatia myricoides* at control sites increased compared to autumn 2019, when mean vegetation condition had decreased below the previously recorded range for this species.

In spring 2019, the mean vegetation condition of *Prostanthera linearis* was similar at longwall and control sites, as indicated by the overlapping error bars (**Figure 22**). At longwall sites the mean vegetation condition decreased slightly compared to autumn 2019, while mean vegetation condition at control sites increased to a level similar to that observed in spring 2018.

In spring 2019, the mean vegetation condition of *Schoenus melanostachys* was higher at control sites compared to longwall sites (**Figure 23**). At both longwall and control sites the mean vegetation condition increased compared with autumn 2019.

At control (compromised) site MRIP07, the vegetation condition for *Prostanthera linearis* and *Schoenus melanostachys* decreased slightly, whilst *Lomatia myricoides* remained unchanged, compared to autumn 2019. At control (compromised) site MRIP08, *Lomatia myricoides* and *Schoenus melanostachys* decreased slightly in condition, whilst *Prostanthera linearis* remained unchanged, compared to autumn 2019 (**Table 12**).

Reproductive status

In spring 2019, the mean reproductive status for tagged riparian indicator species was similar, and minimal, at longwall and control sites for *Lomatia myricoides* and *Prostanthera linearis*, as indicated by overlapping error bars (**Figure 21** and **Figure 22**). For *Schoenus melanostachys*, mean reproductive status was higher at control sites than at longwall sites (**Figure 23**). The mean reproductive status of *Prostanthera linearis* and *Schoenus melanostachys* has been considerably more variable between seasons, and between longwall and control sites within seasons, than for *Lomatia myricoides*, preventing any discernible trend from being detected.

At control (compromised) sites, MRIP07 and MRIP08, the reproductive status recorded in spring 2019 for *Lomatia myricoides*, *Prostanthera linearis* and *Schoenus melanostachys* was slightly lower than results recorded in autumn 2019, although this difference was minor (less than 1) (**Table 12**).

The extent of flowering recorded for each of the tagged riparian indicator species continues to be comparable to results in previous seasons including the baseline monitoring period. The infrequent

recording of flowering plants of *Lomatia myricoides* across the entire survey period is thought to be related to the timing of surveys which do not coincide with peak flowering periods.

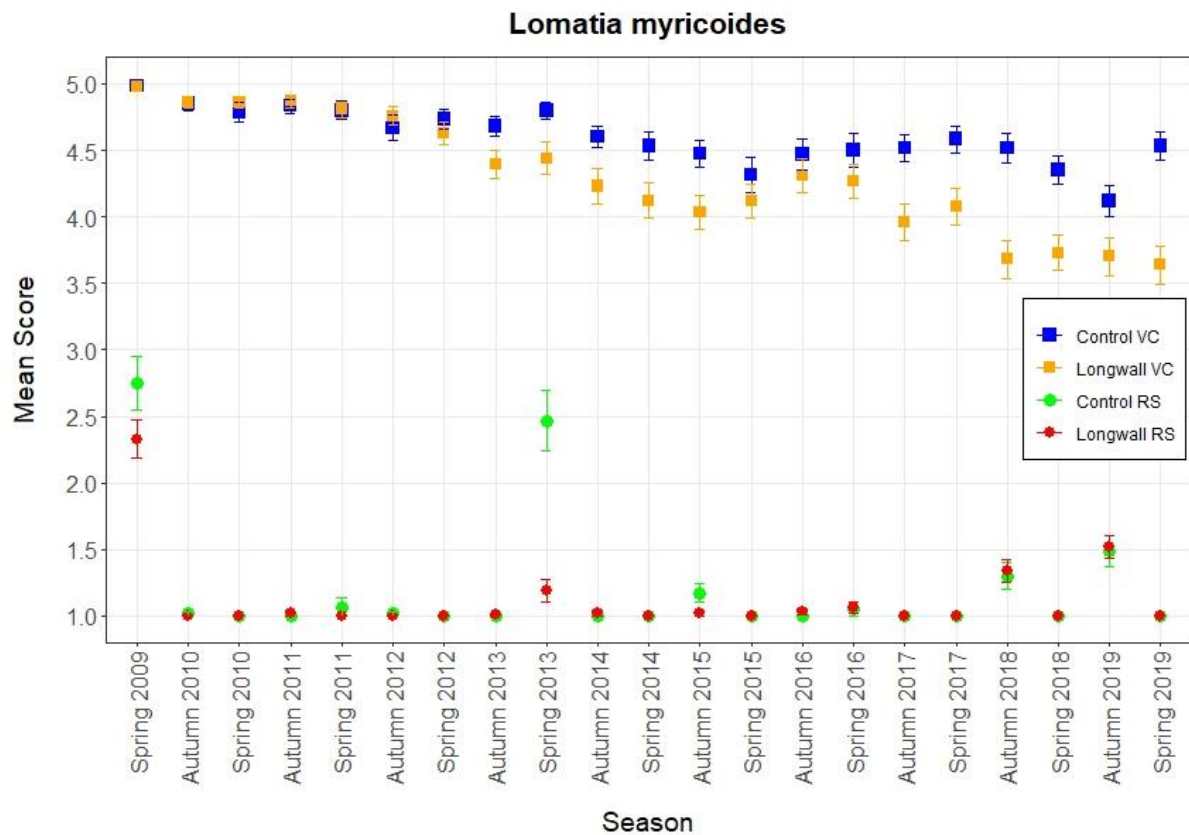


Figure 21: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Lomatia myricoides* (spring 2009 to spring 2019)⁷.

⁷ Riparian vegetation monitoring sites MRIP07 and MRIP08 were used as control sites for comparison against the longwall riparian monitoring sites prior to subsidence impacts occurring to pool on the Eastern Tributary at these sites post spring 2016 and before autumn 2017. These sites have been removed from all seasons data analyses.

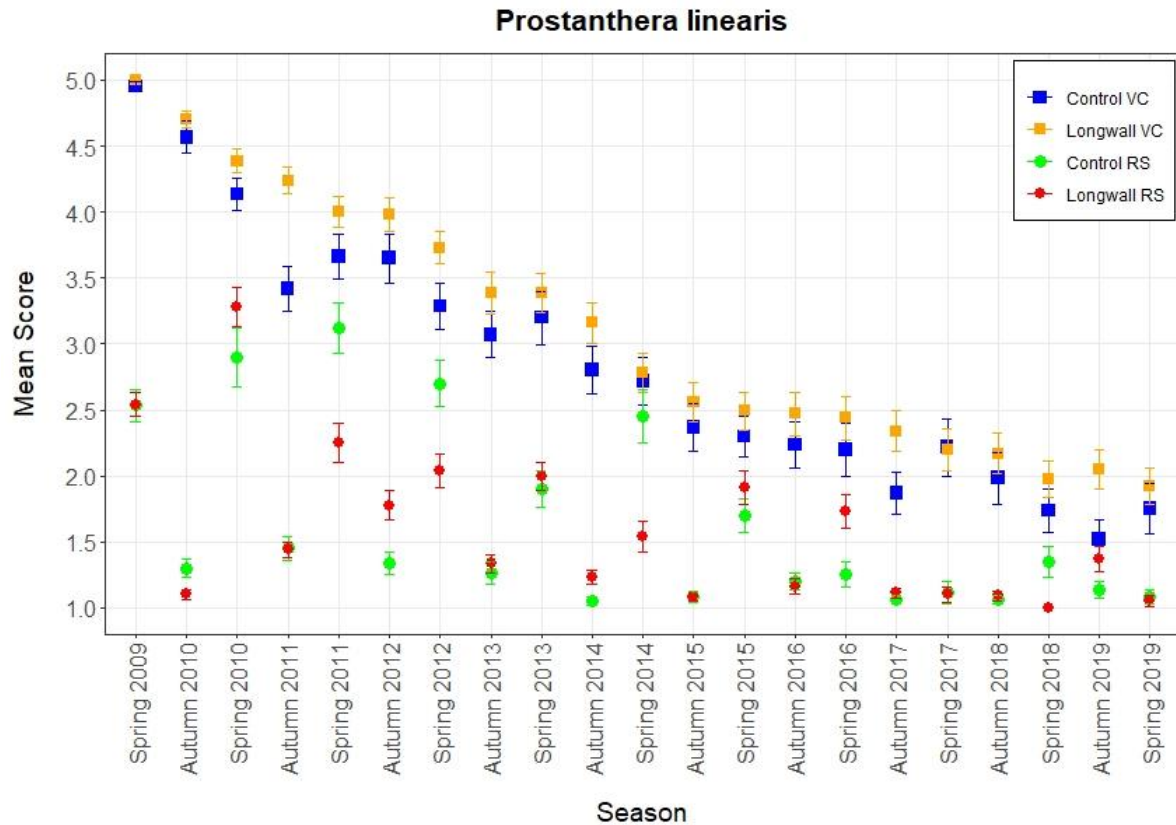


Figure 22: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Prostanthera linearis* (spring 2009 to spring 2019)⁷.

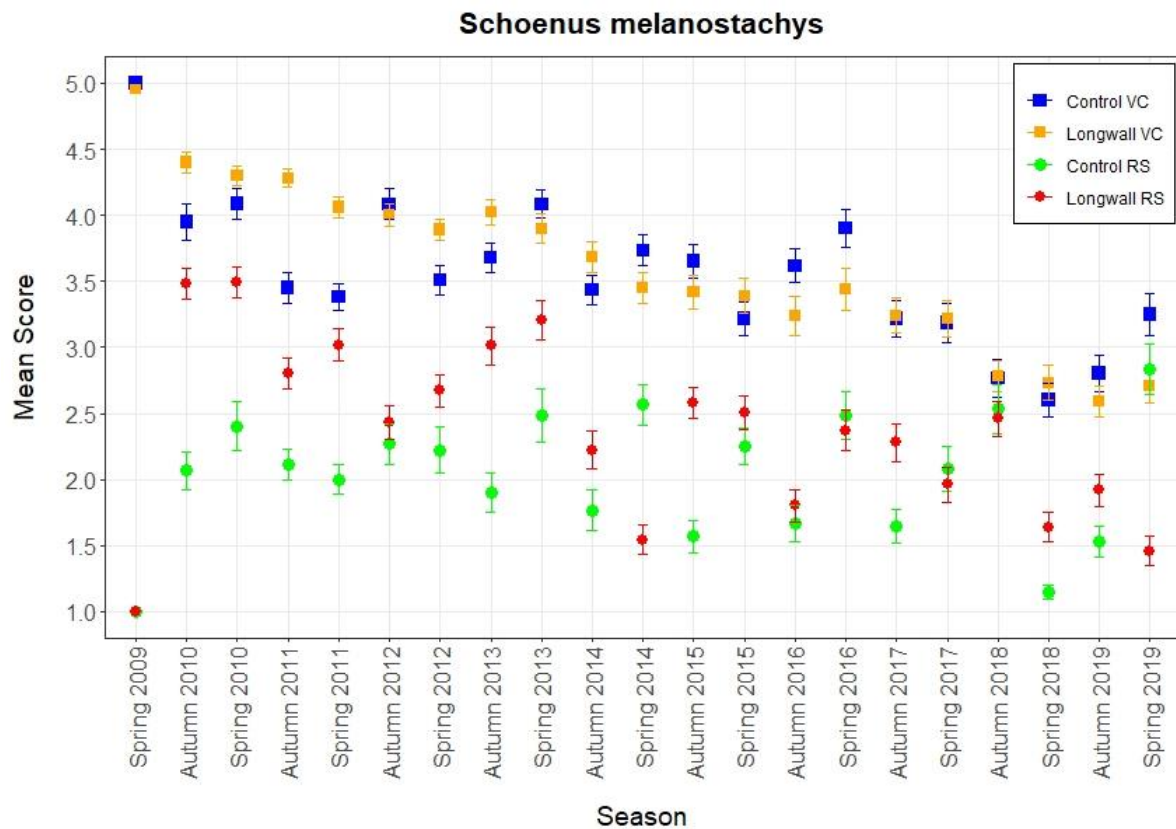


Figure 23: Mean Scores for Vegetation Condition (VC) and Reproductive Status (RS) for the indicator species, *Schoenus melanostachys* (spring 2009 to spring 2019)⁷.

Table 12: Vegetation condition and reproductive status of indicator species at control (compromised) sites MRIP07 and MRIP08 for spring 2016 to spring 2019.

Vegetation Condition															Reproductive status														
Condition Score	MRIP07							MRIP08							Reproductive Rating	MRIP07							MRIP08						
	Spr 2016	Aut 2017	Spr 2017	Aut 2018	Spr 2018	Aut 2019	Spr 2020	Spr 2016	Aut 2017	Spr 2017	Aut 2018	Spr 2018	Aut 2019	Spr 2019		Spr 2016	Aut 2017	Spr 2017	Aut 2018	Spr 2018	Aut 2019	Spr 2020	Spr 2016	Aut 2017	Spr 2017	Aut 2018	Spr 2018	Aut 2019	Spr 2019
Lomatia myricoides															Lomatia myricoides														
C5	13	10	14	8	6	8	6	5	6	7	5	4	5	2	RS5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C4	3	3	5	2	6	3	6	8	7	10	7	11	11	11	RS4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
C3	4	7	1	6	4	5	5	5	5	1	6	3	3	5	RS3	-	-	-	-	-	1	-	-	-	-	-	-	1	-
C2	-	-	-	2	1	2	1	1	1	1	1	1	-	1	RS2	1	-	-	2	-	5	-	-	-	-	1	-	-	-
C1	-	-	-	2	3	2	2	1	1	1	1	1	1	1	RS1	19	20	20	18	17 (3)	12 (2)	18 (2)	19 (1)	19 (1)	19 (1)	17 (1)	19 (1)	18 (1)	19 (1)
Prostanthera linearis															Prostanthera linearis														
C5	10	5	7	10	-	7	6	3	1	5	5	3	2	1	RS5	2	-	-	-	-	-	-	3	-	-	-	-	-	-
C4	3	9	6	1	9	6	5	1	3	-	2	1	2	4	RS4	9	-	1	-	-	-	-	1	-	-	-	-	-	-
C3	4	2	3	4	6	1	3	2	3	2	-	1	1	-	RS3	1	-	-	-	-	7	1	1	-	-	-	-	1	2
C2	-	1	-	1	-	2	-	-	-	-	1	-	-	-	RS2	4	3	-	-	-	4	1	-	-	-	1	-	3	-
C1	3	3	4	4	5	4	6	4	3	3	2	4	5	5	RS1	1 (3)	14 (3)	15 (4)	16 (4)	15 (5)	5 (4)	12 (6)	1 (4)	7 (3)	7 (3)	7 (2)	5 (4)*	1 (5)	3 (5)
Schoenus melanostachys															Schoenus melanostachys														
C5	6	6	1	1	-	1	2	5	2	3	2	2	1	2	RS5	4	-	1	-	-	-	-	-	1	1	-	-	-	-
C4	3	6	10	5	1	6	3	5	4	5	4	5	4	4	RS4	-	10	4	3	1	3	2	4	9	2	8	2	1	1
C3	7	6	6	10	12	8	8	5	10	5	8	8	8	6	RS3	1	1	4	6	1	2	2	1	5	3	1	4	1	1
C2	2	-	1	2	5	3	4	2	3	3	6	5	6	4	RS2	1	3	4	5	1	5	-	3	3	5	3	4	6	2
C1	2	2	2	2	2	2	3	3	1	3	-	-	1	4	RS1	12 (2)	4 (2)	5 (2)	4 (2)	15 (2)	8 (2)	13 (3)	9 (3)	1 (1)	7 (2)	8	10	11 (1)	12 (4)

Numbers in brackets indicate plants which are dead and therefore have a default Reproductive Status of 1

* data for one tagged individual not recorded during survey

Proportion of plants surviving

In spring 2019, 189 of the tagged riparian indicator species were recorded in Condition 1, increasing from 182 individuals in autumn 2019. From autumn 2019 to spring 2019, 28 tagged indicator species individuals declined to Condition 1 after being in a healthier condition in autumn 2019, while 21 individuals recorded in Condition 1 in autumn 2019 were observed in an improved condition in spring 2019.

The proportion of the total number of individuals originally tagged of each of the indicator species which have been recorded as dead within longwall sites, control sites and at control (compromised) sites (MRIP07 and MRIP08) across all monitoring seasons is presented in **Figure 24**, **Figure 25** and **Figure 26**. Up to spring 2016, sites MRIP07 and MRIP08 are included in the control site data. As a result of subsidence impacts prior to autumn 2017, these sites have been separated from the other control sites.

In spring 2019, the proportion of indicator species which were dead was greater at longwall sites than control sites for *Lomatia myricoides* and *Schoenus melanostachys*, as has been the case since autumn 2012 and spring 2013 respectively (**Figure 24** and **Figure 26**). The proportion of tagged *Prostanthera linearis* individuals recorded as Condition 1 in spring 2019 was greater in control sites than longwall sites, an outcome which has been observed since autumn 2017 (**Figure 25**).

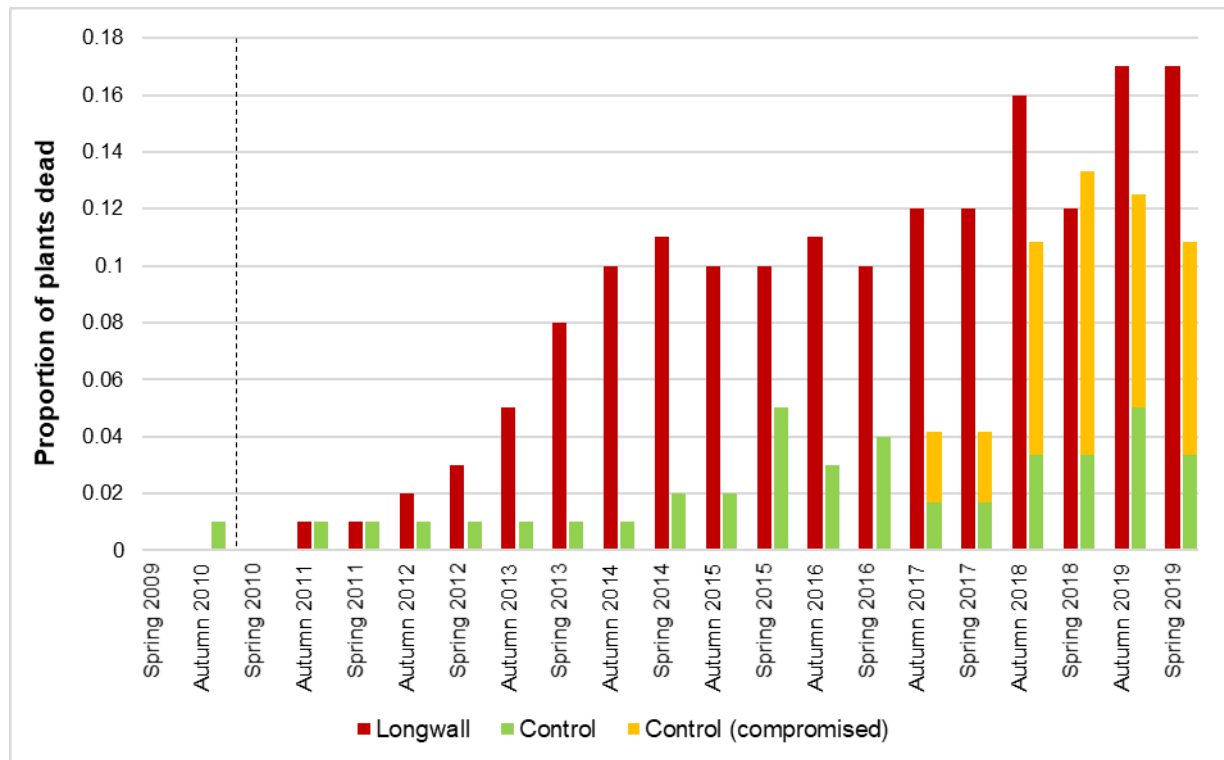


Figure 24: Proportion of tagged *Lomatia myricoides* which have died at longwall and control riparian sites (spring 2009 to spring 2019). Dashed line indicates change from baseline monitoring seasons to monitoring undertaken during and post the mining of Longwalls 20-22.

For *Lomatia myricoides* the proportion of dead individuals in spring 2019 remained unchanged from the previous autumn 2019 season at longwall sites (0.17), while a slight decrease was observed at control sites (from 0.05 to 0.03) (**Figure 24**). Mortality was greatest at longwall sites, with the highest mortality recorded at MRIP02 and MRIP05, which together accounted for 82% of dead individuals of this species across all longwall sites. At longwall sites, the proportion of dead individuals of *Lomatia myricoides* has remained relatively stable (between 0.10 and 0.17) since autumn 2014. The proportion of dead *Lomatia*

myricoides individuals has also remained relatively stable at control sites since spring 2015 (ranging between 0.017 and 0.05).

For *Prostanthera linearis* the proportion of dead individuals in spring 2019 showed a small increase at longwall sites (from 0.63 to 0.67) and a similarly small decrease at control sites (from 0.82 to 0.78), since autumn 2019 (**Figure 25**). The number of dead individuals were evenly spread across all longwall sites, with each contributing between 21 – 24% apart from MRIP09, which only accounted for 12% of *Prostanthera linearis* mortality in longwall sites. Similarly, control sites each accounted for 28 – 38% of dead *Prostanthera linearis* individuals. Prior to the decrease in proportion dead observed at control sites in spring 2019, the proportion of dead *Prostanthera linearis* individuals had gradually increased in both longwall and control sites since spring 2010.

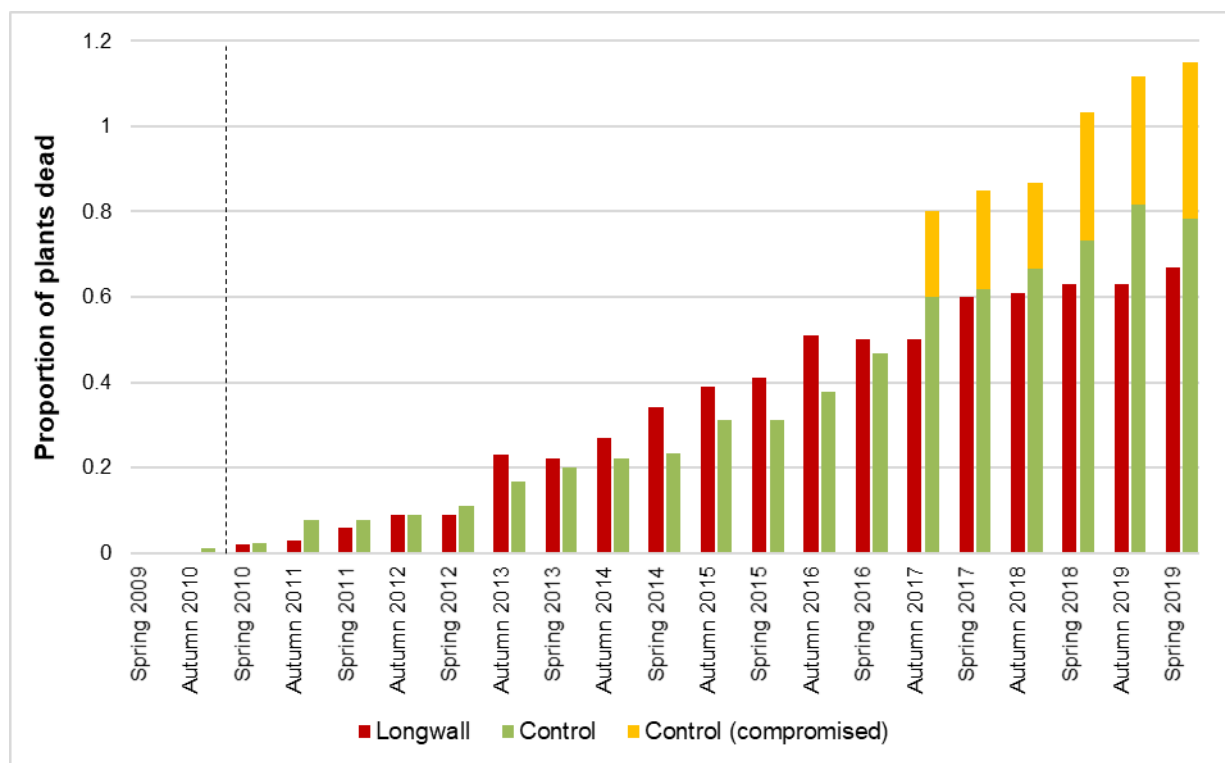


Figure 25: Proportion of tagged *Prostanthera linearis* which have died at longwall and control riparian sites (spring 2009 to spring 2019). Dashed line indicates change from baseline monitoring seasons to monitoring undertaken during and post the mining of Longwalls 20-22.

For *Schoenus melanostachys*, the proportion of dead individuals in spring 2019 was slightly higher at longwall sites (from 0.26 to 0.28) and slightly lower at control sites (from 0.15 to 0.12), than in autumn 2019 (**Figure 26**). In contrast, mortality at control (compromised) sites, MRIP07 and MRIP08, in spring 2019 showed a large increase since autumn 2019 (from 0.08 to 0.18). Overall, mortality was greatest at longwall sites, with the highest mortality recorded at MRIP02, which accounted for 64% of dead individuals of this species across all longwall sites. Prior to autumn 2019, the proportion dead had been increasing consistently at both control and longwall sites since autumn 2017. This trend continues at longwall sites in the current spring 2019 survey, however a small decrease was again observed at control sites.

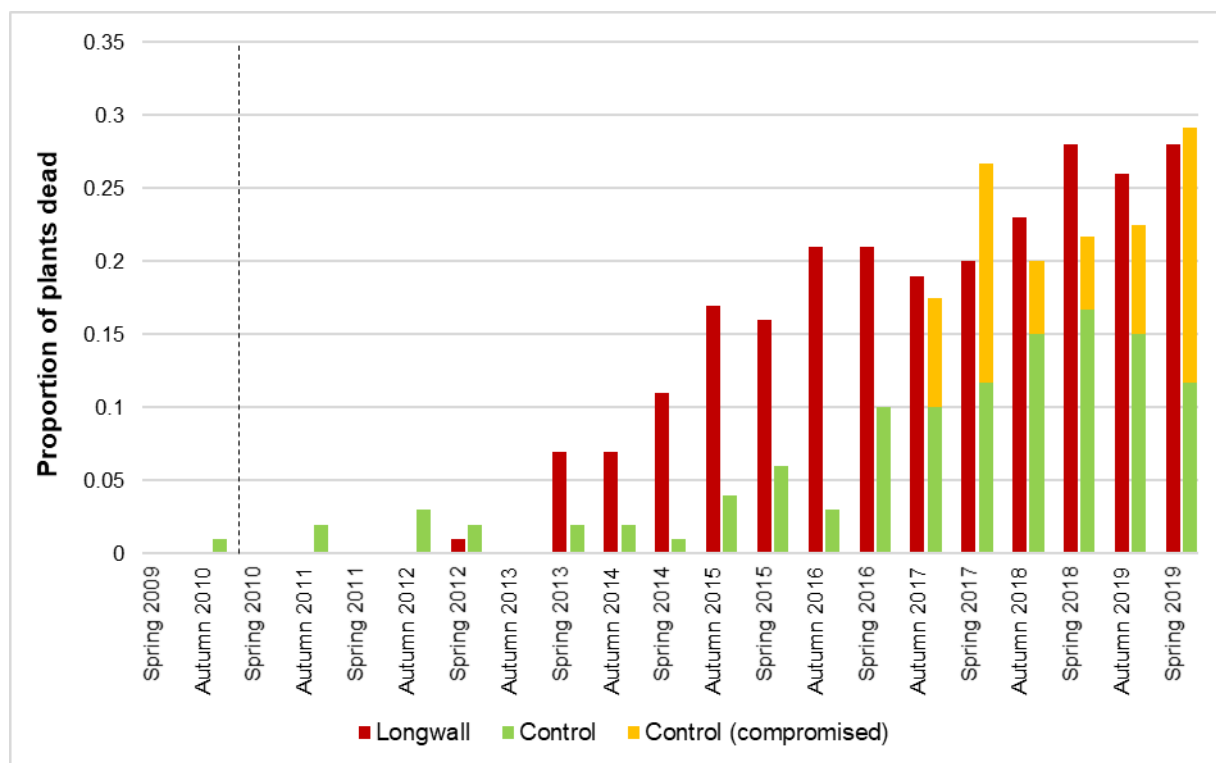


Figure 26: Proportion of tagged *Schoenus melanostachys* which have died at longwall and control riparian sites (spring 2009 to spring 2019). Dashed line indicates change from baseline monitoring seasons to monitoring undertaken during and post the mining of Longwalls 20-22.

3.2.4 Assessment against performance indicators

In accordance with the Longwall 304 Biodiversity Management Plan, the visual observations are used to assess the riparian vegetation performance indicator:

Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal

The Riparian Vegetation Trigger Action Response Plan (TARP) from the Longwall 304 Biodiversity Management Plan is provided in **Appendix C**.

Results of the visual observations, are described in **Section 3.2.1** above. A summary of the results in relation to the riparian vegetation TARP is provided in **Table 13**.

Within longwall site MRIP05 the vegetation dieback that has been observed since autumn 2018 had not extended in spring 2019. No new areas of dieback were observed in spring 2019 and regrowth was observed in the lower storey species.

As no riparian sites were identified as having dieback of vegetation greater than 50 cm from the stream during the spring 2019 survey, the performance indicator '*Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal*' has not been exceeded in spring 2019.

Table 13: Summary of Riparian Vegetation monitoring against Trigger Action Response Plan.

Performance Indicator	Baseline	Significance Levels/ Triggers ²		Spring 2019 Monitoring Results	Action/Response	Comments
<i>Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal</i>	No dieback of riparian vegetation prior to the commencement of Longwall 20 as a result of mining. Dieback of riparian vegetation greater than 50 cm from the stream identified at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary during the mining of Longwalls 20-27.	Level 1	No dieback of riparian vegetation greater than 50 cm from the stream as a result of mine subsidence.	Sites MRIP01, MRIP03, MRIP04, MRIP06, MRIP07, MRIP08 and MRIP10	Continue monitoring. Six monthly reporting. For sites that were previously observed with riparian vegetation dieback greater than 50 cm record the reasons for the reduction in dieback (e.g. vegetation recovery, new stream bank resulting from erosion, other).	None of the sites have previously been observed with riparian vegetation dieback greater than 50 cm from the stream.
		Level 2	Vegetation monitoring: - does not identify an increase in the extent of vegetation dieback compared to that observed at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary; and - does not identify vegetation dieback greater than 50 cm from the stream at sites MRIP01, MRIP03, MRIP04, MRIP06, MRIP07, MRIP08 or MRIP10, as a result of mine subsidence.	Sites MRIP02, MRIP05 and MRIP09	Consider recent stream features mapping results and pool water level monitoring data. Consider extent of erosion associated with areas of vegetation dieback and whether management measures are required. Six monthly reporting.	Stream conditions at sites MRIP02, MRIP05 and MRIP09 are described in Section 3.2.1 (along with previous observations at these sites). Scouring of the stream bank and erosion resulting from high water flows following heavy rain events described in Section 3.2.1 . The extent of dieback at sites previously observed with riparian vegetation dieback (MRIP02, MRIP05 and MRIP09) had not increased in the current survey and vegetation recovery was apparent.
		Level 3	Vegetation monitoring: - identifies an increase in the extent of vegetation dieback compared to that observed at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary; and - identifies vegetation dieback greater than 50 cm from the stream at sites MRIP01, MRIP03, MRIP04, MRIP06, MRIP07, MRIP08, MRIP10, MRIP11 or MRIP12, as a result of mine subsidence.	No sites.	Consider recent stream features mapping results and pool water level monitoring data. Initiate assessment against the performance measure ¹ . Consider the need for management measures, in accordance with Sections 8 and 9.	-

¹ Threatened species, populations and ecological communities include those listed under the BC Act, EPBC Act or Fisheries Management Act at the time of Project Approval (i.e. the lists current as at 22 June 2009).

² Note: some sites listed are applicable to, and assessed in, the Longwalls 23-27 Spring 2019 Vegetation Monitoring Report.

3.3 Significant species

Six species of conservation significance were recorded during spring 2019 (**Appendix D**), all of which have been recorded previously (**Table 14**). Generally, the significant species observed during the transect/quadrat monitoring and visual inspections in spring 2019 were in healthy condition (Condition 5) at both longwall and control sites, with isolated individuals of *Lomandra fluviatilis* within riparian monitoring site MRIP01 recorded with minor dieback (Condition 4). Additionally, minor dieback (Condition 4) was recorded for isolated individuals of *Pultenaea aristata* across a number of longwall sites (**Table 14**). However, this represents an overall improvement in condition for this species, compared to previous seasons.

Table 14: Species of conservation significance recorded across vegetation monitoring sites, spring 2019.

Species	Conservation significance			Location and condition
	EPBC Act	BC Act	RoTAP Code	
<i>Darwinia diminuta</i>	–	–	2RCi	Swamps 17, 18, 24, 101, 111a and 125 – Recorded in good condition within all swamps in spring 2019.
<i>Eucalyptus luehmanniana</i>	–	–	2RCa	Swamps 18 and 25 – Recorded in good condition within all swamps in spring 2019.
<i>Hibbertia nitida</i>	–	–	2RC-	MRIP01, MRIP02, MRIP03, MRIP05, MRIP06, MRIP07 and MRIP08 – Recorded in good condition (Condition 5) within all riparian quadrats in spring 2019.
<i>Lomandra fluviatilis</i>	–	-	3RCa	MRIP01, MRIP04, MRIP07 and MRIP08 – Recorded in good condition within all riparian quadrats except MRIP01 where it was recorded with minor dieback (Condition 4) in spring 2019.
<i>Pultenaea aristata</i>	V	V	2V	Swamps 16, 17, 18, 25, 101 and 111a – Recorded in good condition within all sites in spring 2019, with isolated individuals recorded with minor dieback (Condition 4 – Swamp 16, 17 and 18). See Section 3.1.3 for details regarding condition of monitored populations of this species.
<i>Tetratheca neglecta</i>	–	–	3RC-	Swamp 24 – Recorded in good condition in spring 2019.

Legend

- BC Act (NSW *Biodiversity Conservation Act 2016*): V = Vulnerable
- EPBC Act (Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*): V = Vulnerable
- RoTAP (Rare or Threatened Australian Plants) Code:
 - 3 = Geographic range in Australia more than 100 km
 - 2 = Geographic range in Australia less than 100 km
 - R = Rare in Australia but does not have an identifiable threat
 - C = Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 - V = Vulnerable
 - a = 1000 plants or more are known to occur within a conservation reserve(s)
 - i = less than 1000 plants are known to occur within a conservation reserve(s)
 - = reserved population size is not accurately known

Details regarding the condition of monitored populations of *Pultenaea aristata* are provided in **Section 3.1.3**.

One species of conservation significance which has previously been recorded, *Acacia baueri* subsp. *aspera*, was not recorded in the current spring 2019 survey. This species is known from one individual within the control site Swamp 111a. In the autumn 2018 survey this individual was recorded with some dead branches (Condition 3) and has not been recorded from spring 2018 onwards.

Hibbertia nitida was recorded in good condition (Condition 5) in spring 2019, which represents an improvement in the overall condition of this species relative to previous seasons. *Hibbertia nitida* occurs more frequently within longwall riparian sites and is usually found away from the direct top of bank zone. As such, the dieback recorded in previous seasons is not considered to be related to the mining of Longwalls 20-22 and is more likely a result of the impacts of flooding which produce high velocity water flows carrying woody debris.

3.4 Introduced species

No weed species were observed within any of the longwall or control upland swamps in the current spring 2019 survey.

Four introduced species were observed in, and around, longwall and control riparian sites during spring 2019, namely: *Andropogon virginicus* (Whiskey Grass) (MRIP02, MRIP03 and MRIP10), *Conyza* sp., (Fleabane) (MRIP01 and MRIP02), *Gamochaeta* sp. (Cudweed) (MRIP02 and MRIP04) and *Senecio madagascariensis* (Fireweed) (MRIP02). No introduced aquatic species have been recorded in streams adjacent to the riparian monitoring sites.

Including the observations in spring 2019, introduced species have been recorded in very low abundance in individual seasons, at all riparian monitoring sites except MRIP07. In addition to those mentioned above, weed species recorded include: *Ageratina adenophora* (Crofton Weed), *Cirsium vulgare* (Spear Thistle), *Cyperus eragrostis* (Umbrella Sedge), *Cyperus* sp, *Digitaria* sp., *Facelis retusa* (Annual Trampweed), *Gamochaeta spicata*, *Hypochaeris radicata* (Catsear) and *Sonchus oleraceus* (Sowthistle). The low occurrence of introduced species within the riparian monitoring sites is attributed to downstream dispersal from weed sources located in the upper catchment at Darkes Forest, along the Princes Highway and from Flat Rock Crossing where vehicle access may also promote weed spread.

Beyond the monitoring sites, weeds have been observed in low densities at Flat Rock Crossing, the area between MRIP03 and MRIP04, as well as scattered occurrences along verges of the main access roads (e.g. Fire trail 9H, Fire trail 9, Fire trail 9J). These include *Ageratina adenophora*, *Andropogon virginicus*, *Conyza* sp., *Gamochaeta* sp. (Cudweeds) and *Senecio madagascariensis*. Weed control works have been conducted along portions of Fire Trails 9H and 9J targeting *Ageratina adenophora* and *Andropogon virginicus*. Control of these species within areas upslope of riparian vegetation is likely to reduce the occurrences of these species within the riparian zone.

4 Conclusions

4.1 Upland swamp vegetation monitoring

The key findings of the Longwalls 20–22 spring 2019 upland swamp vegetation survey (since the previous autumn 2019 survey) can be summarised as follows:

- The declining trend in the condition of longwall swamp vegetation previously recorded by vegetation monitoring in spring 2017 and autumn 2018 for Swamps 16, 17, 18, 24 and 25 has stabilised for the third survey season and recovery, in the form of new growth on many of the impacted species, was apparent in spring 2019. Swamps 16, 17, 18, 24 and 25 have therefore remained at 'significance Level 1' in accordance with the upland swamp vegetation monitoring TARP.
- Dieback of *Gleichenia* spp. across Swamp 20 has ceased and signs of recovery (regrowth) were observed. Swamp 20 has therefore returned to 'significance Level 1' in accordance with the upland swamp vegetation monitoring TARP.

Given the above, the upland swamp vegetation performance indicator, *the vegetation in upland swamps is not expected to experience changes significantly different to changes in control swamps*, has not been exceeded in spring 2019.

4.2 Riparian vegetation monitoring

The key findings of the Longwalls 20–22 spring 2019 riparian vegetation survey (since the previous autumn survey) can be summarised as follows:

- Dieback of riparian vegetation greater than 50 cm from the stream as a result of mine subsidence at sites MRIP01, MRIP03, MRIP04, MRIP06, MRIP07, MRIP08 and MRIP10 has not been observed to date. These sites remain at 'significance Level 1' in accordance with the riparian vegetation monitoring TARP.
- Areas previously observed with riparian vegetation dieback at sites MRIP02, MRIP05 and MRIP09 were not observed with the same extent of dieback in the current survey and vegetation recovery was apparent. These sites remain at 'significance Level 2' in accordance with the riparian vegetation monitoring TARP.

Given the above, the riparian vegetation performance indicator, *impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal*, has not been exceeded in spring 2019.

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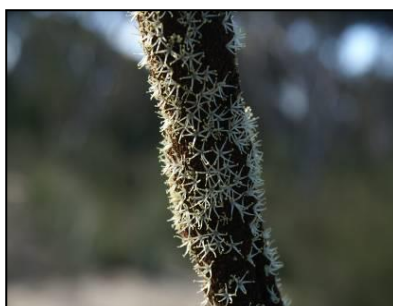


Metropolitan Coal Vegetation Monitoring

Longwalls 20-22 Spring 2019 Appendices

Prepared for
Metropolitan Coal

12 October 2020



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Appendix A : Datasheets

Floristic Vegetation Survey



Date: _____ Recorder: _____ Site No: _____
 Camera No: _____ Photo No: _____

Location: _____

Quadrat Size (if not 20 x 20 m): _____

Map Name: _____ Scale: _____
 Grid Ref: E _____ N _____ Datum _____ Accuracy _____
 Lat: _____ S Long: _____ E

Landform Pattern: _____
 Morphology _____ Element _____
 Altitude: _____ metres
 Slope: _____ degrees
 Aspect: _____ degrees (magnetic)
 Horizontal Elevation: N _____ NE _____ E _____ SE _____ S _____ SW _____ W _____ NW _____

Map Geology: _____ Lithology: _____

Soil:

Compaction _____

Texture: _____

Colour: _____

Depth: _____ Deep (>1m) _____ Shallow (0.3-1m) _____ Skeletal (<0.3m) _____

Fire History _____ How determined _____

Disturbance: (circle)

erosion _____ logging _____ litter _____ weeds _____ feral animals _____

Comments: _____

Vegetation Structure: (Walker & Hopkins, 1983)

Stratum	Height (m)	% Cover	Dominant Species

Structural Formation Class: _____

Comments: _____

Floristic Composition

Date:

Site No:

No.	Species	C/A	Cond*	Notes	No.	Species	C/A	Cond*	Notes
1					31				
2					32				
3					33				
4					34				
5					35				
6					36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

Condition

- 1 severe damage/dieback
- 2 many dead stems
- 3 some dead branches
- 4 minor damage
- 5 healthy

Cover Abundance Scale (Modified Braun Blanquet)

- 1 = < 5% of site and rare (< 3 individuals)
- 2 = < 5% of site and uncommon (> 3 sparsely scattered)
- 3 = < 5% of site and common – consistent throughout plot
- 4 = cover of 5%-20%
- 5 = cover of 20% - 50% of site
- 6 = cover of 50% - 75% of site
- 7 = cover of 75% - 100% of site

o-h – overhanging; B – Buds; FL – Flowers; FR – Fruit

Floristic Vegetation Survey



Date: _____ Recorder: _____ Site No: _____

Camera No: _____ Photo No: _____

Location: _____

Quadrat Size (if not 20 x 20 m): _____

Map Name: _____ Scale: _____

Grid Ref: E _____ N _____ Datum _____ Accuracy _____

Lat: _____ S _____ Long: _____ E _____

Landform Pattern: _____

Morphology _____ Element _____

Altitude: _____ metres

Slope: _____ degrees

Aspect: _____ degrees (magnetic)

Horizontal Elevation: N _____ NE _____ E _____ SE _____ S _____ SW _____ W _____ NW _____

Map Geology: _____ Lithology: _____

Soil: _____

Compaction _____

Texture: _____

Colour: _____

Depth: _____ Deep (>1m) _____ Shallow (0.3-1m) _____ Skeletal (<0.3m) _____

Fire History _____ How determined _____

Disturbance: (circle) _____

erosion _____ logging _____ litter _____ weeds _____ feral animals _____

Comments: _____

Vegetation Structure: (Walker & Hopkins, 1983)

Stratum	Height (m)	% Cover	Dominant Species

Structural Formation Class: _____

Comments: _____

Floristic Composition

* All Condition 5 unless otherwise indicated

No.	Species	C/A	Cond*	Notes
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Condition

1 severe damage/dieback
 2 many dead stems
 3 some dead branches
 4 minor damage
 5 healthy

o-h - overhanging; B - Buds; FL - Flowers; FR - Fruit

Cover Abundance Scale (Modified Braun-Blanquet)

1 = < 5% of site and rare (< 3 individuals)
 2 = < 5% of site and uncommon (> 3 sparsely scattered)
 3 = < 5% of site and common - consistent throughout plot
 4 = cover of 5%-20%
 5 = cover of 20% - 50% of site
 6 = cover of 50% - 75% of site
 7 = cover of 75% - 100% of site

Population Monitoring**Autumn 2020**Species: Lomatia myricoidesSite No: MRIP01Tag Colour: Orange

Date: _____

Recorder: _____

Tag No.	Easting	Northing	Condition	Height	Rating - Flowers	Rating - Fruits	Notes
G1							
G2							
G3							
G4							
G5							
G6							
G7							
G8/G201							
G9							
G10							
G11							
G12							
G13							
G14							
G15							
G16							
G17							
G18							
G19							
G20							

Reproductive Ratings

- 1 – Nil
- 2 – Sparse
- 3 – Low
- 4 – Moderate
- 5 – High

occasional flowers only
under 25% of potential
25% – 75% of potential
75% – 100 % of potential

Condition

- 1 severe damage/dieback
- 2 many dead stems
- 3 some dead branches
- 4 minor damage
- 5 healthy

Visual Inspections for subsidence impacts – Swamps – Autumn 2020



Site No: Swamp 101

Date: _____

Recorder: _____

Potential Subsidence Impacts	Comments			
Cracking of exposed bedrock or sediments	No	Yes – extent and location:		
Any weeds	No	Yes – species and number:		
Large areas of unusual senescing vegetation	No	Yes – extent and location:		
Any species with dieback observed incl. number individuals impacted: (<i>F</i> -few, <i>O</i> - occasional, <i>C</i> -common), and distribution: (<i>I</i> - isolated, <i>S</i> - scattered, <i>W</i> - widespread).				
Amount of seepage – incl. location				
Swamp surface sediments	Dry	Damp/moist	Wet	Saturated - standing water
Changes in water colour or location etc.				
Areas of increased erosion – incl. severity, type & location (i.e. minor gully erosion in table drain)				
Other comments (Recent rainfall events, anthropogenic impacts, any other comments/observations)				

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Site no: Swamp 101

Camera: _____

Photo Points	Photo No(s).	Waypoints	Comments
PP1 Top end by track junction	50° 85°	Correct on GPS	
PP2 E. haemastoma near top	20° 60° 75°	Correct on GPS	
PP3 Along track at end of T1 (near) (mapping and GPS a bit off)	40° 280° 345°	308707 6216567	
PP4 Pinch point, E haemastoma	35° 80° 90°	308761 6216607	
PP5 Lower swamp, north side, middle Rock step next to track	130° 250° 195°	308808 6216628	
PP6 End of T3	170° 235° 260° 200° 80°	308735 6216621	
PP7 Lower swamp, E. haemastoma below PP5	115° 150° 230° 210°	308818 6216628	

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Appendix B : Site details

Longwalls 20-22 – Vegetation Monitoring Sites

Site	Monitoring techniques	Control / LW	Location	Easting, Northing	Vegetation	Site marker	Transect orientation
SWAMPS – Valley Side							
S16	Visual observations; Transects/quadrats	LW21	South of Fire Road 9C, left branch	309578 6214935	Sedgeland-Heath Complex/ Sandstone Heath Woodland	At start	T1 – 75° T2 – 350° T3 – 345°
S17	Visual observations; Transects/quadrats	LW21	North of Fire Road 9C, left branch	309619 6214932	Sedgeland-Heath Complex/ Sandstone Heath Woodland	At start	T1 – 350° T2 – 8° T3 – 345°
S18	Visual observations; Transects/quadrats; Population monitoring of indicator species	LW21	North of Fire Road 9C, left branch	309737 6214891	Sedgeland-Heath Complex	At start	T1 – 340° T2 – Due north T3 – 50°
S24	Visual observations; Transects/quadrats; Population monitoring of indicator species	LW21-22	East of Fire Road 9G, just south of Fire Road 9J	311339 6214013	Sedgeland-Heath Complex	At start	T1 – Due north T2 – 20° T3 – 30°
S25	Visual observations; Transects/quadrats; Population monitoring of indicator species	LW21-22	East of Fire Road 9G, just south of Fire Road 9J	311169 6214010	Sedgeland-Heath Complex	At start	T1 – 70° T2 – 60° T3 – 60°
S101	Visual observations; Transects/quadrats; Population monitoring of indicator species	Control	East of Fire Road 9	308652 6216578	Sedgeland-Heath Complex	At start	T1 – Due east T2 – 60° T3 – 50°
S111a	Visual observations; Transects/quadrats; Population monitoring of indicator species	Control	East of Fire Road 9	308887 6217040	Sedgeland-Heath Complex	At start	T1 – 60° T2 – 90° T3 – 90°
S125	Visual observations; Transects/quadrats; Population monitoring of indicator species	Control	North-west of Fire Road 9D	309717 6218864	Sedgeland-Heath Complex	At start	T1 – Due west T2 – 280° T3 – 300°
SWAMPS – TEA TREE THICKET							
S20	Visual observations; Transects/quadrats; Population monitoring of indicator species	LW21	West of Fire Road 9G and south of Fire Road 9J	310444 6214383	Tea Tree Thicket	At start	T1 – 250° T2 – 225° T3 – 225°
Woronora River 1	Visual observations; Transects/quadrats; Population monitoring of indicator species	Control	Darkes Forest Road, upstream from Woronora River Crossing	306406 6214962	Tea Tree Thicket	At start	T1 – 90°
Woronora River south arm	Visual observations; Transects/quadrats; Population monitoring of indicator species	Control	North of walking track off Darkes Forest Road, north of Fire Road 10H	306414 6213953	Tea Tree Thicket	At start	T1 – 60°
Dahlia Swamp	Visual observations; Transects/quadrats; Population monitoring of indicator species	Control	North of Fire Road 10H, off Darkes Forest Road	306149 6212874	Tea Tree Thicket	At start	T1 – 60°

Longwalls 20-22 – Vegetation Monitoring Sites

Site	Monitoring techniques	Control / LW	Location	Easting, Northing	Vegetation	Site marker	Transect orientation
RIPARIAN SITES							
MRIP01	Visual observations; Quadrat data; and Population monitoring of indicator species	LW20	Waratah Rivulet, west bank, adj. to monitoring box	309835 6214400	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP02	Visual observations; Quadrat data; and Population monitoring of indicator species	LW21	Waratah Rivulet, west bank	301017 6214635	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP03	Visual observations; Quadrat data; and Population monitoring of indicator species	Control	Waratah Rivulet, east bank	310428 6215311	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP04	Visual observations; Quadrat data; and Population monitoring of indicator species	Control	Waratah Rivulet, east bank	311049 6215492	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP05	Visual observations; Quadrat data; and Population monitoring of indicator species	LW21	Creek east of Fire Road 9G, access via ford on Fire Road 9J, east bank	311473 6213759	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP06	Visual observations; Quadrat data; and Population monitoring of indicator species	LW22	Creek east of Fire Road 9G, access via ford on Fire Road 9J, east bank	311587 6213939	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP07	Visual observations; Quadrat data; and Population monitoring of indicator species	Former Control	Creek east of Fire Road 9G, access via end of Fire Trail 9G, west bank	312144 6215259	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP08	Visual observations; Quadrat data; and Population monitoring of indicator species	Former Control	Creek east of Fire Road 9G, access via end of Fire Road 9G, west bank	312161 6215499	Sandstone Riparian Scrub	At start	Downstream from peg
MRIP09	Visual observations; and Population monitoring of indicator species	LW20	Eastern Tributary, upstream of site MRIP05	311424 6213600	Sandstone Riparian Scrub	-	Traverses
MRIP10	Visual observations; and Population monitoring of indicator species	Control	Waratah Rivulet, downstream from site MRIP04	311150 6215600	Sandstone Riparian Scrub	-	Traverses

Appendix C : Upland swamp and riparian vegetation performance indicators – Tables 12 and 14 of the Longwall 304 Biodiversity Management Plan

Table 12
Trigger Action Response Plan – Upland Swamp Vegetation Monitoring

Performance Measure	Performance Indicator	Monitoring Sites	Parameters	Frequency/ Sample Size	Analysis Methodology	Error Types	Baseline	Significance Levels/ Triggers	Action/Response
Negligible impact on Threatened Species, Populations, or Ecological Communities	<i>The vegetation in upland swamps is not expected to experience changes significantly different to vegetation in control swamps</i>	- Swamps 16, 17, 18, 20, 24 and 25 overlying or adjacent to Longwalls (LW) 20-22. - Swamps 19, 28, 30, 31, 32, 33, 34, 35, 36 and 94 overlying or adjacent to LW23-27. - Swamps 40, 41, 47, 48, 49, 50, 53 and 58 overlying or adjacent to LW301-303. - Swamps within the 35° angle of draw and/or predicted 20 mm subsidence contour of LW304 (i.e. those listed for LW301-303 above). - Control Swamps 101, 111a, 125, 135, 136, 137a, 137b, 138, Bee Creek Swamp, Woronora River 1, Woronora River south arm and Dahlia Swamp.	- Visual inspections¹. - Transect/ quadrat data². - Population monitoring of indicator species³.	Biannually, in autumn and spring.	- Visual assessment of changes in the condition of the swamps over time. - Qualitative analysis of collected vegetation data. - Statistical analysis of species diversity (e.g. ANOVA⁴ or cluster analysis⁵). - Qualitative analysis of proportions of plants surviving, and differences in health and reproduction ratings over time and relative to control swamps.	- Subjective nature of visual observations and qualitative analysis. - Statistical significance levels. Significant = $P < 0.05$	- LW20-22 swamps, as detailed in the LW20-22 vegetation monitoring report for the spring 2008 to autumn 2010 surveys⁶. - LW23-27 swamps, as detailed in the LW23-27 vegetation monitoring report for the spring 2010 to spring 2013 surveys⁷. - LW301-303 swamps, as detailed in the LW301-303 vegetation monitoring report for the spring 2015 to autumn 2017 surveys⁸. - LW304 swamps since spring 2015. Additional baseline data will be collected prior to LW304 commencement.	Level 1 Data analysis indicates: - there is not a declining trend in the condition of longwall swamp vegetation; and - there are no significant changes in vegetation between the mined and control swamps.	Continue monitoring. Six monthly reporting.
								Level 2 Data analysis indicates: - there is a declining trend in the condition of longwall swamp vegetation over time, however a similar trend is occurring in control swamp vegetation; or - there are significant differences in vegetation between the mined and control swamps, however, the data indicates longwall swamp vegetation is consistent with the baseline monitoring results.	Consider swamp groundwater monitoring data. Six monthly reporting.
								Level 3 Data analysis indicates: - there is a declining trend in the condition of longwall swamp vegetation over time that is not occurring in control swamp vegetation; or - there are significant differences in vegetation between the mined and control swamps, and the data indicates longwall swamp vegetation is not consistent with the baseline monitoring results.	Consider swamp groundwater monitoring data. Initiate assessment against the performance measure ⁹ . Consider the need for management measures, in accordance with Sections 8 and 9.

¹ Visual inspections will be conducted in all swamps listed under 'Monitoring Sites' in this table, as well as Swamp 46 and Swamp 51/52.

² Transect/quadrat monitoring will continue to be conducted in Swamps 16, 17, 18, 20, 24 and 25 overlying Longwalls 20-22, Swamps 28, 30, 33, 35 and 94 overlying or adjacent to Longwalls 23-27, Swamps 40, 41, 46, 51/52 and 53 over Longwalls 301-303, and in control swamps. Transect/quadrat monitoring will be conducted in Swamp 48 and Swamp 50 over or adjacent to Longwall 304.

³ Indicator species monitoring will continue to be conducted in Swamps 18, 20, 24 and 25 overlying Longwalls 20-22, Swamps 19, 28, 30, 33, 35 and 94 overlying or adjacent to Longwalls 23-27, Swamps 40 and 53 over Longwalls 301-303, and in control swamps.

⁴ In general, the purpose of ANOVA is to test for significant differences between means.

⁵ The term cluster analysis encompasses a number of different algorithms and methods for grouping objects of similar kind into respective categories.

⁶ Eco Logical Australia (2010) *Metropolitan Coal Vegetation Monitoring Longwalls 20-22 - Baseline Data*. Report prepared for Metropolitan Coal.

⁷ Eco Logical Australia (2013) *Metropolitan Coal Vegetation Monitoring Longwalls 23-27 - Baseline data*. Report prepared for Metropolitan Coal.

⁸ Eco Logical Australia (2018) *Metropolitan Coal Vegetation Monitoring Longwalls 301-303 - Baseline data*. Report prepared for Metropolitan Coal.

⁹ Threatened species, populations and ecological communities include those listed under the BC Act, EPBC Act or Fisheries Management Act at the time of Project Approval (i.e. the lists current as at 22 June 2009).

Table 14
Trigger Action Response Plan – Riparian Vegetation Monitoring

Performance Measure	Performance Indicator	Monitoring Sites	Parameters	Frequency/ Sample Size	Analysis Methodology	Error Types	Baseline	Significance Levels/ Triggers		Action/Response
Negligible impact on Threatened Species, Populations, or Ecological Communities	<i>Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal</i>	Locations adjacent to riparian vegetation monitoring sites (MRIP01 to MRIP12) and areas traversed whilst accessing the monitoring sites: • sites MRIP01, MRIP02, MRIP05, MRIP06 and MRIP09 overlying Longwalls (LW) 20-22; • sites MRIP11 and MRIP12 overlying LW23-27; • sites MRIP03, MRIP04 and MRIP10 downstream of LW23A; and • sites MRIP07 and MRIP08 downstream of LW23-27.	The extent of vegetation subject to vegetation dieback.	Biannually, in autumn and spring.	Assessment of the extent of riparian vegetation dieback.	Subjective nature of visual observations.	No dieback of riparian vegetation prior to the commencement of LW20 as a result of mining. Dieback of riparian vegetation greater than 50 cm from the stream identified at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary compared to that observed up to and including the spring 2017 vegetation survey; and MRIP05 and MRIP09 on the Eastern Tributary as a result of mine subsidence during the mining of LW20-27.	Level 1	No dieback of riparian vegetation greater than 50 cm from the stream as a result of mine subsidence.	Continue monitoring. Six monthly reporting.
								Level 2	Vegetation monitoring: - does not identify an increase in the extent of vegetation dieback at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary compared to that observed up to and including the spring 2017 vegetation survey; and - does not identify vegetation dieback greater than 50 cm from the stream at sites MRIP01, MRIP03, MRIP04, MRIP06, MRIP07, MRIP08, MRIP10, MRIP11 or MRIP12, as a result of mine subsidence.	Consider recent stream features mapping results and pool water level monitoring data. Consider extent of erosion associated with areas of vegetation dieback and whether management measures are required. Six monthly reporting.
								Level 3	Vegetation monitoring: - identifies an increase in the extent of vegetation dieback at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary compared to that observed up to and including the spring 2017 vegetation survey; and - identifies vegetation dieback greater than 50 cm from the stream at sites MRIP01, MRIP03, MRIP04, MRIP06, MRIP07, MRIP08, MRIP10, MRIP11 or MRIP12, as a result of mine subsidence.	Consider recent stream features mapping results and pool water level monitoring data. Initiate assessment against the performance measure ¹ . Consider the need for management measures, in accordance with Sections 8 and 9.

¹ Threatened species, populations and ecological communities include those listed under the BC Act, EPBC Act or Fisheries Management Act at the time of Project Approval (i.e. the lists current as at 22 June 2009).

Appendix D : Species lists – Upland swamp monitoring sites and riparian monitoring sites

Longwalls 20-22 – Spring 2019

Species list – Upland Swamp monitoring sites

Family	Species	Common Name
Anthericaceae	<i>Thysanotus juncifolius</i>	
Apiaceae	<i>Actinotus minor</i>	Lesser Flannel Flower
	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
	<i>Platysace linearifolia</i>	
	<i>Xanthosia pilosa</i>	Woolly Xanthosia
	<i>Xanthosia tridentata</i>	Rock Xanthosia
Aspleniaceae	<i>Asplenium flabellifolium</i>	Necklace Fern
Casuarinaceae	<i>Allocasuarina distyla</i>	
	<i>Allocasuarina littoralis</i>	Black She-Oak
	<i>Allocasuarina</i> spp.	
Colchicaceae	<i>Burchardia umbellata</i>	Milkmaids
Cunoniaceae	<i>Bauera microphylla</i>	
	<i>Bauera rubioides</i>	River Rose
Cyperaceae	<i>Baumea rubiginosa</i>	
	<i>Baumea</i> spp.	
	<i>Chorizandra cymbaria</i>	
	<i>Cyathochaeta diandra</i>	
	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge
	<i>Lepidosperma filiforme</i>	
	<i>Lepidosperma laterale</i>	Variable Sword-sedge
	<i>Lepidosperma limicola</i>	
	<i>Lepidosperma neesii</i>	
	<i>Lepidosperma quadrangulatum</i>	
	<i>Ptilothrix deusta</i>	
	<i>Schoenus brevifolius</i>	
	<i>Schoenus ericetorum</i>	
	<i>Schoenus lepidosperma</i>	
	<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i>	
	<i>Schoenus melanostachys</i>	
Dicksoniaceae	<i>Calochlaena dubia</i>	Rainbow Fern
Dilleniaceae	<i>Hibbertia riparia</i>	
	<i>Hibbertia serpyllifolia</i>	Hairy Guinea Flower
Droseraceae	<i>Drosera peltata</i>	A Sundew
	<i>Drosera spatulata</i>	
Elaeocarpaceae	<i>Tetradlea juncea</i>	Black-eyed Susan
	<i>Tetradlea neglecta</i> ▲3RC-	
Ericaceae	<i>Epacris microphylla</i>	Coral Heath
	<i>Epacris obtusifolia</i>	Blunt-leaf Heath
	<i>Epacris paludosa</i>	Swamp Heath
	<i>Leucopogon esquamatus</i>	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	
	<i>Monotoca scoparia</i>	
	<i>Sprengelia incarnata</i>	Pink Swamp Heath
	<i>Styphelia tubiflora</i>	Red Five-Corner
	<i>Woollsia pungens</i>	
Euphorbiaceae	<i>Micrantheum ericoides</i>	
Fabaceae (Faboideae)	<i>Bossiaea ensata</i>	Sword Bossiaea
	<i>Bossiaea scolopendria</i>	
	<i>Daviesia corymbosa</i>	
	<i>Dillwynia floribunda</i>	

Longwalls 20-22 – Spring 2019

Species list – Upland Swamp monitoring sites

Family	Species	Common Name
	<i>Dillwynia retorta</i>	
	<i>Gompholobium glabratum</i>	Dainty Wedge Pea
	<i>Mirbelia rubiifolia</i>	Heathy Mirbelia
	++ <i>Pultenaea aristata</i> ▲2V	Prickly Bush-pea
	<i>Pultenaea stipularis</i>	
	<i>Pultenaea tuberculata</i>	
Fabaceae (Mimosoideae)	<i>Acacia linearifolia</i>	Narrow-leaved Wattle
	<i>Acacia linifolia</i>	White Wattle
	<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney Golden Wattle
	<i>Acacia rubida</i>	Red-stemmed Wattle
	<i>Acacia suaveolens</i>	Sweet Wattle
	<i>Acacia terminalis</i>	Sunshine Wattle
Gleicheniaceae	<i>Gleichenia dicarpa</i>	Pouched Coral Fern
	<i>Gleichenia microphylla</i>	Scrambling Coral Fern
Goodeniaceae	<i>Dampiera stricta</i>	
Haloragaceae	<i>Gonocarpus micranthus</i>	
	<i>Gonocarpus tetragynus</i>	Poverty Raspwort
Iridaceae	<i>Patersonia sericea</i>	Silky Purple-Flag
Lauraceae	<i>Cassytha glabella</i>	
Lindsaeaceae	<i>Lindsaea linearis</i>	Screw Fern
Lobeliaceae	<i>Lobelia anceps</i>	
Lomandraceae	<i>Lomandra cylindrica</i>	
	<i>Lomandra filiformis</i>	Wattle Matt-rush
	<i>Lomandra glauca</i>	Pale Mat-rush
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush
	<i>Lomandra obliqua</i>	
Myrtaceae	<i>Angophora hispida</i>	Dwarf Apple
	<i>Baeckea imbricata</i>	
	<i>Baeckea linifolia</i>	Weeping Baeckea
	<i>Callistemon citrinus</i>	Crimson Bottlebrush
	<i>Calytrix tetragona</i>	Common Fringe-myrtle
	<i>Corymbia gummifera</i>	Red Bloodwood
	<i>Darwinia diminuta</i> ▲2RCi	
	<i>Darwinia fascicularis</i>	
	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum
	<i>Eucalyptus luehmanniana</i> ▲2RCa	Yellow Top Mallee Ash
	<i>Eucalyptus oblonga</i>	Stringybark
	<i>Eucalyptus piperita</i>	Sydney Peppermint
	<i>Eucalyptus racemosa</i>	Narrow-leaved Scribbly Gum
	<i>Eucalyptus sieberi</i>	Silvertop Ash
	<i>Eucalyptus</i> spp.	
	<i>Kunzea capitata</i>	
	<i>Leptospermum arachnoides</i>	
	<i>Leptospermum grandifolium</i>	Woolly Teatree
	<i>Leptospermum juniperinum</i>	Prickly Tea-tree
	<i>Leptospermum polygalifolium</i>	Tantoon
	<i>Leptospermum squarrosus</i>	
	<i>Leptospermum trinervium</i>	Slender Tea-tree
	<i>Melaleuca squarrosa</i>	Scented Paperbark
Orchidaceae	<i>Cryptostylis subulata</i>	Large Tongue Orchid

Longwalls 20-22 – Spring 2019

Species list – Upland Swamp monitoring sites

Family	Species	Common Name
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry
Plantaginaceae	<i>Veronica plebeia</i>	Trailing Speedwell
Poaceae	<i>Anisopogon avenaceus</i>	Oat Speargrass
	<i>Entolasia stricta</i>	Wiry Panic
	<i>Hemarthria uncinata</i>	Matgrass
	<i>Tetrarrhena turfosa</i>	
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	
	<i>Banksia marginata</i>	Silver Banksia
	<i>Banksia oblongifolia</i>	Fern-leaved Banksia
	<i>Banksia robur</i>	Swamp Banksia
	<i>Banksia serrata</i>	Old-man Banksia
	<i>Grevillea oleoides</i>	Red Spider Flower
	<i>Hakea dactyloides</i>	Finger Hakea
	<i>Hakea gibbosa</i>	
	<i>Hakea teretifolia</i>	Needlebush
	<i>Isopogon anemonifolius</i>	Broad-leaf Drumsticks
	<i>Isopogon anethifolius</i>	Narrow-leaf Drumsticks
	<i>Lambertia formosa</i>	Mountain Devil
	<i>Lomatia silaifolia</i>	Crinkle Bush
	<i>Persoonia levis</i>	Broad-leaved Geebung
	<i>Persoonia pinifolia</i>	Pine-leaved Geebung
	<i>Petrophile pulchella</i>	Conesticks
	<i>Petrophile sessilis</i>	
	<i>Symphionema paludosum</i>	
Restionaceae	<i>Baloskion gracile</i>	
	<i>Chordifex dimorphus</i>	
	<i>Chordifex fastigiatus</i>	
	<i>Empodisma minus</i>	
	<i>Leptocarpus tenax</i>	
	<i>Lepyrodia scariosa</i>	
	<i>Sporadanthus gracilis</i>	
Rhamnaceae	<i>Cryptandra ericoides</i>	Heathy Cryptandra
Rutaceae	<i>Boronia ledifolia</i>	Sydney Boronia
	<i>Boronia parviflora</i>	Swamp Boronia
Santalaceae	<i>Leptomeria acida</i>	Sour Currant Bush
Selaginellaceae	<i>Selaginella uliginosa</i>	Swamp Selaginella
Stylidiaceae	<i>Stylidium lineare</i>	Narrow-leaved Triggerplant
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	
Xyridaceae	<i>Xyris gracilis</i>	

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

▲ RoTAP species

2: Geographic range in Australia less than 100 km

3: Geographic range in Australia more than 100 km

R: Rare in Australia but does not have an identifiable threat

C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve

V: Taxon not presently Endangered, but at risk over a longer period

a: 1000 plants or more are known to occur within a conservation reserve(s)

i: less than 1000 plants are known to occur within a conservation reserve(s)

:- reserved population size is not accurately known

Longwalls 20-22 – Spring 2019

Species list – Riparian monitoring sites

Family	Species	Common Name
Apiaceae	<i>Actinotus minor</i>	Lesser Flannel Flower
	<i>Xanthosia pilosa</i>	Woolly Xanthosia
	<i>Xanthosia tridentata</i>	Rock Xanthosia
Asteraceae	<i>Gamochaeta</i> spp.*	
Blandfordiaceae	<i>Blandfordia nobilis</i>	Christmas Bells
Casuarinaceae	<i>Allocasuarina distyla</i>	
	<i>Allocasuarina littoralis</i>	Black She-Oak
Centrolepidaceae	<i>Centrolepis strigosa</i> subsp. <i>strigosa</i>	
Cunoniaceae	<i>Bauera rubioides</i>	River Rose
	<i>Callicoma serratifolia</i>	Black Wattle
	<i>Ceratopetalum apetalum</i>	Coachwood
	<i>Ceratopetalum gummiferum</i>	Christmas Bush
Cupressaceae	<i>Callitris rhomboidea</i>	Port Jackson Pine
Cyperaceae	<i>Baumea juncea</i>	
	<i>Baumea</i> spp.	
	<i>Caustis pentandra</i>	Thick Twist Rush
	<i>Chorizandra cymbaria</i>	
	<i>Cyathochaeta diandra</i>	
	<i>Cyperus gracilis</i>	Slender Flat-sedge
	<i>Eleocharis gracilis</i>	
	<i>Gymnoschoenus sphaerocephalus</i>	Button Grass
	<i>Isolepis cernua</i>	Nodding Club-rush
	<i>Isolepis</i> spp.	Club-rush
	<i>Lepidosperma laterale</i>	Variable Sword-sedge
	<i>Schoenus melanostachys</i>	
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower
	<i>Hibbertia nitida</i> ▲2RC-	
Doryanthaceae	<i>Doryanthes excelsa</i>	Gymea Lily
Droseraceae	<i>Drosera binata</i>	Forked Sundew
	<i>Drosera peltata</i>	A Sundew
	<i>Drosera spatulata</i>	
Ericaceae	<i>Epacris longiflora</i>	Fuchsia Heath
	<i>Epacris microphylla</i>	Coral Heath
	<i>Epacris obtusifolia</i>	Blunt-leaf Heath
	<i>Epacris pulchella</i>	Wallum Heath
	<i>Leucopogon amplexicaulis</i>	Beard-heath
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	
	<i>Monotoca scoparia</i>	
	<i>Woolisia pungens</i>	
Euphorbiaceae	<i>Micrantheum ericoides</i>	
	<i>Pseudanthus pimeleoides</i>	
Fabaceae (Faboideae)	<i>Aotus ericoides</i>	
	<i>Dillwynia floribunda</i>	
	<i>Gompholobium glabratum</i>	Dainty Wedge Pea
	<i>Pultenaea blakelyi</i>	
	<i>Pultenaea stipularis</i>	
Fabaceae (Mimosoideae)	<i>Acacia linifolia</i>	White Wattle
	<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney Golden Wattle
	<i>Acacia obtusifolia</i>	

Longwalls 20-22 – Spring 2019

Species list – Riparian monitoring sites

Family	Species	Common Name
	<i>Acacia terminalis</i>	Sunshine Wattle
	<i>Acacia ulicifolia</i>	Prickly Moses
Gleicheniaceae	<i>Gleichenia microphylla</i>	Scrambling Coral Fern
	<i>Sticherus flabellatus</i> var. <i>flabellatus</i>	Umbrella Fern
Goodeniaceae	<i>Dampiera stricta</i>	
Haloragaceae	<i>Gonocarpus micranthus</i>	
	<i>Gonocarpus teucroides</i>	Germander Raspwort
Juncaceae	<i>Juncus prismatocarpus</i>	
Juncaginaceae	<i>Triglochin procera</i>	Water Ribbons
Lamiaceae	<i>Prostanthera linearis</i>	Narrow-leaved Mint-bush
Lauraceae	<i>Cassytha glabella</i>	
Loganiaceae	<i>Logania albiflora</i>	
	<i>Lomandra cylindrica</i>	
	<i>Lomandra fluvialis</i> ▲3RCa	
	<i>Lomandra gracilis</i>	
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
	<i>Lomandra obliqua</i>	
	<i>Angophora costata</i>	Sydney Red Gum
	<i>Baeckea linifolia</i>	Weeping Baeckea
	<i>Callistemon citrinus</i>	Crimson Bottlebrush
	<i>Corymbia gummifera</i>	Red Bloodwood
	<i>Darwinia fascicularis</i>	
	<i>Eucalyptus agglomerata</i>	Blue-leaved Stringybark
	<i>Eucalyptus piperita</i>	Sydney Peppermint
	<i>Eucalyptus sieberi</i>	Silvertop Ash
	<i>Kunzea ambigua</i>	Tick Bush
	<i>Leptospermum grandifolium</i>	Woolly Teatree
	<i>Leptospermum morrisonii</i>	
	<i>Leptospermum polygalifolium</i>	Tantoon
	<i>Leptospermum squarrosum</i>	
	<i>Leptospermum trinervium</i>	Slender Tea-tree
	<i>Melaleuca squarrosa</i>	Scented Paperbark
	<i>Tristania neriifolia</i>	Water Gum
	<i>Tristaniopsis collina</i>	Mountain Water Gum
	<i>Tristaniopsis laurina</i>	Kanooka
Orchidaceae	<i>Cryptostylis erecta</i>	Tartan Tongue Orchid
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax-lily
Phyllanthaceae	<i>Phyllanthus hirtellus</i>	Thyme Spurge
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry
	<i>Anisopogon avenaceus</i>	Oat Speargrass
	<i>Austrostipa pubescens</i>	
	<i>Austrostipa</i> spp.	A Speargrass
	<i>Entolasia stricta</i>	Wiry Panic
	<i>Microlaena stipoides</i>	Weeping Grass
	<i>Tetrarrhena juncea</i>	Wiry Ricegrass
	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	
	<i>Banksia marginata</i>	Silver Banksia
	<i>Banksia oblongifolia</i>	Fern-leaved Banksia
	<i>Banksia serrata</i>	Old-man Banksia
	<i>Grevillea diffusa</i> subsp. <i>diffusa</i>	

Longwalls 20-22 – Spring 2019

Species list – Riparian monitoring sites

Family	Species	Common Name
	<i>Hakea dactyloides</i>	Finger Hakea
	<i>Hakea salicifolia</i>	Willow-leaved Hakea
	<i>Hakea teretifolia</i>	Needlebush
	<i>Lambertia formosa</i>	Mountain Devil
	<i>Lomatia myricoides</i>	River Lomatia
	<i>Lomatia silaifolia</i>	Crinkle Bush
	<i>Persoonia pinifolia</i>	Pine-leaved Geebung
	<i>Petrophile pulchella</i>	Conesticks
	<i>Stenocarpus salignus</i>	Scrub Beefwood
Restionaceae	<i>Chordifex dimorphus</i>	
	<i>Chordifex fastigiatus</i>	
	<i>Empodisma minus</i>	
	<i>Eurychorda complanata</i>	
	<i>Leptocarpus tenax</i>	
	<i>Lepyrodia scariosa</i>	
	<i>Sporadanthus gracilis</i>	
Rhamnaceae	<i>Pomaderris elliptica</i> subsp. <i>elliptica</i>	
Rubiaceae	<i>Opercularia aspera</i>	Coarse Stinkweed
Rutaceae	<i>Leionema dentatum</i>	Toothed Phebalium
	<i>Leionema diosmeum</i>	
	<i>Nematolepis squamea</i> subsp. <i>squamea</i>	Satinwood
Santalaceae	<i>Leptomeria acida</i>	Sour Currant Bush
Sapindaceae	<i>Dodonaea triquetra</i>	Large-leaf Hop-bush
Scrophulariaceae	<i>Gratiola peruviana</i>	Australian Brooklime
Smilacaceae	<i>Smilax glycyphylla</i>	Sweet Sarsparilla
Sterculiaceae	<i>Lasiopetalum ferrugineum</i>	
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>	
Xanthorrhoeaceae	<i>Xanthorrhoea media</i>	
Xyridaceae	<i>Xyris gracilis</i>	
	<i>Xyris operculata</i>	

* Non-native species

▲ RoTAP species

2: Geographic range in Australia less than 100 km

3: Geographic range in Australia more than 100 km

R: Rare in Australia but does not have an identifiable threat

C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve

a: 1000 plants or more are known to occur within a conservation reserve(s)

-: reserved population size is not accurately known

Appendix E : Vegetation monitoring raw data – Valley side swamp monitoring sites

Vegetation structure, dominant species and estimated cover for each stratum – Valley side swamps

Valley Side Swamp monitoring sites – Spring 2019

Swamp 16 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S16T1Q1S19	T	10	10	10	<i>Eucalyptus oblonga</i>
	M1	0.6	2.5	35	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Leucopogon microphyllus</i> var. <i>microphyllus</i>
	L1	0	0.5	20	<i>Lepidosperma filiforme</i> , <i>Chordifex dimorphus</i> , <i>Lepidosperma neesii</i>
S16T1Q2S19	M1	0.5	3.3	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.7	5	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Lepidosperma filiforme</i>
S16T1Q3S19	M1	0.5	3	50	++ <i>Pultenaea aristata</i> ▲2V, <i>Kunzea capitata</i> , <i>Lambertia formosa</i>
	L1	0	1.1	10	<i>Chordifex dimorphus</i> , <i>Lepidosperma filiforme</i> , <i>Ptilothrix deusta</i>
S16T1Q4S19	M1	0.3	2.1	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Kunzea capitata</i>
	L1	0	1.4	15	<i>Chordifex fastigiatus</i> , <i>Xanthorrhoea resinosa</i>
Transect 2					
S16T2Q1S19	T	4.5	5	10	<i>Eucalyptus oblonga</i>
	M1	0.1	2.5	20	<i>Angophora hispida</i>
	L1	0	0.6	10	<i>Lepidosperma laterale</i> , <i>Ptilothrix deusta</i>
S16T2Q2S19	M1	0.2	2	20	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leucopogon esquamatus</i>
	L1	0	1	5	<i>Lepidosperma laterale</i> , <i>Ptilothrix deusta</i>
S16T2Q3S19	M1	0.4	1.7	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Dillwynia retorta</i> , <i>Petrophile pulchella</i>
	L1	0	1.2	30	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
Transect 3					
S16T3Q1S19	T	6	8	30	<i>Eucalyptus racemosa</i>
	M1	1	3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Epacris microphylla</i>
	L1	0	1.3	40	<i>Xanthorrhoea resinosa</i> , <i>Lepyrodia scariosa</i> , <i>Schoenus brevifolius</i>
S16T3Q2S19	M1	0.2	3	40	<i>Angophora hispida</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	1	<i>Cyathochaeta diandra</i> , <i>Lepyrodia scariosa</i> , <i>Xanthorrhoea resinosa</i>
S16T3Q3S19	M1	0.3	2.4	40	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	10	<i>Lepyrodia scariosa</i> , <i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S16T3Q4S19	M1	0.2	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	30	<i>Lepyrodia scariosa</i> , <i>Lepidosperma filiforme</i> , <i>Ptilothrix deusta</i>
S16T3Q5S19	M1	0.7	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1.2	40	<i>Chordifex dimorphus</i> , <i>Lepidosperma filiforme</i> , <i>Xanthorrhoea resinosa</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

▲ RoTAP species

2: Geographic range in Australia less than 100 km

V: Taxon not presently Endangered, but at risk over a longer period

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S17T1Q1S19	M1	0.1	3	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	0.9	5	<i>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i>
S17T1Q2S19	M1	0.2	2.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1	15	<i>Lepidosperma filiforme</i> , <i>Ptilothrix deusta</i> , <i>Xanthorrhoea resinosa</i>
S17T1Q3S19	M1	0.3	2	80	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Kunzea capitata</i>
	L1	0	1.2	20	<i>Chordifex dimorphus</i> , <i>Lepidosperma filiforme</i>
Transect 2					
S17T1Q1S19	M1	0.1	2	30	<i>Calytrix tetragona</i> , <i>Petrophile pulchella</i> , <i>Baeckea imbricata</i>
	L1	0	1.5	10	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i> , <i>Lepidosperma filiforme</i>
S17T2Q2S19	T	4	5	40	<i>Eucalyptus racemosa</i>
	M1	0.5	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , ++ <i>Pultenaea aristata</i> ▲2V, <i>Leptospermum squarrosum</i>
	L1	0	1	20	<i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i> , <i>Hibbertia riparia</i>
S17T2Q3S19	M1	0.4	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	1	<i>Lepidosperma filiforme</i> , <i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S17T2Q4S19	T	4.5	6	40	<i>Eucalyptus oblonga</i>
	M1	0.2	2	70	<i>Banksia marginata</i>
	L1	0	1	5	<i>Lepidosperma filiforme</i>
S17T2Q5S19	M1	0.4	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Lambertia formosa</i> , <i>Calytrix tetragona</i>
	L1	0	1.2	30	<i>Lepidosperma filiforme</i> , <i>Chordifex fastigiatus</i> , <i>Chordifex dimorphus</i>
S17T2Q6S19	M1	0.1	2.5	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Kunzea capitata</i>
	L1	0	1	25	<i>Chordifex dimorphus</i> , <i>Xanthorrhoea resinosa</i>
S17T2Q7S19	M1	0.2	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1	20	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
Transect 3					
S17T3Q1S19	M1	0.8	4	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	5	<i>Lepidosperma filiforme</i>
S17T3Q2S19	M1	0.1	4	80	<i>Leptospermum trinervium</i> , <i>Hakea dactyloides</i>
	L1	0	1	15	<i>Lepidosperma filiforme</i>
S17T3Q3S19	M1	0.2	1.7	30	<i>Angophora hispida</i> , <i>Hakea teretifolia</i> , <i>Calytrix tetragona</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
	L1	0	0.3	5	<i>Lepyrodia scariosa</i>
S17T3Q4S19	M1	1.2	2	10	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Platysace linearifolia</i> , <i>Pultenaea stipularis</i>
	L1	0	1	40	<i>Angophora hispida</i> , <i>Lepidosperma filiforme</i> , <i>Lomandra obliqua</i>
S17T3Q5S19	M1	0.6	2	30	<i>Angophora hispida</i>
	L1	0	1	40	<i>Lepidosperma filiforme</i>
S17T3Q6S19	M1	0.1	1.4	40	<i>Calytrix tetragona</i>
	L1	0	0.5	10	<i>Lepyrodia scariosa</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)▲ RoTAP species

2: Geographic range in Australia less than 100 km

V: Taxon not presently Endangered, but at risk over a longer period

Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S18T1Q1S19	T	8	12	10	<i>Corymbia gummifera</i> , <i>Eucalyptus racemosa</i>
	M1	0.5	2.5	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Kunzea capitata</i> , <i>Hibbertia serpyllifolia</i>
	L1	0	1.1	20	<i>Chordifex fastigiatus</i> , <i>Xanthorrhoea resinosa</i>
S18T1Q2S19	M1	0.3	2	35	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hibbertia riparia</i>
	L1	0	1.2	10	<i>Chordifex dimorphus</i> , <i>Chordifex fastigiatus</i>
S18T1Q3S19	M1	0.2	2.3	40	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Chordifex dimorphus</i> , <i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
S18T1Q4S19	M1	0.3	2	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Kunzea capitata</i>
	L1	0	1.5	10	<i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
S18T1Q5S19	M1	0.5	2	35	<i>Kunzea capitata</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	10	<i>Chordifex fastigiatus</i>
S18T1Q6S19	M1	0.5	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Kunzea capitata</i>
	L1	0	1.3	20	<i>Chordifex fastigiatus</i> , <i>Chordifex dimorphus</i>
S18T1Q7S19	T	4	5	2	<i>Eucalyptus luehmanniana</i> ▲2RCa
	M1	0.3	2	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.4	1	<i>Chordifex fastigiatus</i> , <i>Lepyrodis scariosa</i> , <i>Ptilothrix deusta</i>
S18T1Q8S19	M1	0.4	2.2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.4	5	<i>Chordifex fastigiatus</i>
S18T1Q9S19	T	3	4	1	<i>Allocasuarina distyla</i>
	M1	0.5	2		<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Kunzea capitata</i> , <i>Hibbertia riparia</i>
	L1	0	1.2		<i>Chordifex fastigiatus</i> , <i>Leptospermum arachnoides</i>
Transect 2					
S18T2Q1S19	T	2.5	3	5	<i>Hakea dactyloides</i> , <i>Leptospermum trinervium</i>
	M1	0.5	1.8	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Calytrix tetragona</i>
	L1	0	1.1	10	<i>Chordifex dimorphus</i> , <i>Chordifex fastigiatus</i> , <i>Xanthorrhoea resinosa</i>
S18T2Q2S19	M1	0.2	1.6	20	<i>Kunzea capitata</i>
	L1	0	0.6	1	<i>Ptilothrix deusta</i> , <i>Lepyrodis scariosa</i>
S18T2Q3S19	M1	0.2	1.7	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Epacris microphylla</i>
	L1	0	1.5	5	<i>Chordifex fastigiatus</i> , <i>Lepyrodis scariosa</i> , <i>Ptilothrix deusta</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S18T2Q4S19	M1	0.4	2	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , ++ <i>Pultenaea aristata</i> ▲2V, <i>Baeckea imbricata</i>
	L1	0	1	10	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S18T2Q5S19	M1	0.2	2	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Baeckea imbricata</i>
	L1	0	1.5	5	<i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
S18T2Q6S19	M1	0.7	2.3	35	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Empodisma minus</i>
S18T2Q7S19	M1	0.6	2.5	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	30	<i>Xanthorrhoea resinosa</i> , <i>Bauera microphylla</i> , <i>Chordifex fastigiatus</i>
S18T2Q8S19	M1	0.2	1.4	10	<i>Kunzea capitata</i> , <i>Baeckea imbricata</i> , <i>Bauera microphylla</i>
	L1	0	1.2	5	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S18T2Q9S19	M1	0.4	1.7	20	<i>Baeckea imbricata</i> , <i>Leptospermum squarrosum</i> , <i>Kunzea capitata</i>
	L1	0	0.9	10	<i>Lepyrodia scariosa</i> , <i>Chordifex fastigiatus</i>
S18T2Q10S19	M1	0.4	2.5	55	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Callistemon citrinus</i>
	L1	0	1.4	15	<i>Xanthorrhoea resinosa</i> , <i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i>
Transect 3					
S18T3Q1S19	M1	0.3	3.4	55	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	1	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S18T3Q2S19	M1	0.3	0.9	55	<i>Leptospermum squarrosum</i> , <i>Epacris microphylla</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	10	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S18T3Q3S19	L1	0	1.2	5	<i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
	M1	0.7	2.2	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
S18T3Q4S19	L1	0	0.7	5	<i>Lepidosperma filiforme</i>
	M1	0.3	3.4	55	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)▲ RoTAP species

2: Geographic range in Australia less than 100 km

R: Rare in Australia but does not have an identifiable threat

C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve

V: Taxon not presently Endangered, but at risk over a longer period

a: 1000 plants or more are known to occur within a conservation reserve(s)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S24T1Q1S19	M1	0.8	3	60	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.7	70	<i>Baloskion gracile</i> , <i>Epacris microphylla</i> , <i>Hibbertia serpyllifolia</i>
S24T1Q2S19	M1	0.6	2.7	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Baeckea imbricata</i>
	L1	0	1.5	60	<i>Baloskion gracile</i> , <i>Leptocarpus tenax</i> , <i>Schoenus brevifolius</i>
S24T1Q3S19	M1	0.5	3	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Bauera microphylla</i>
	L1	0	1.1	20	<i>Empodisma minus</i> , <i>Leptocarpus tenax</i> , <i>Xyris gracilis</i>
S24T1Q4S19	M1	0.8	3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Baeckea imbricata</i>
	L1	0	1.2	10	<i>Empodisma minus</i> , <i>Ptilothrix deusta</i> , <i>Leptocarpus tenax</i>
S24T1Q5S19	M1	0.8	2.5	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	30	<i>Empodisma minus</i> , <i>Chordifex fastigiatus</i> , <i>Leptocarpus tenax</i>
S24T1Q6S19	M1	0.5	2.5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Baeckea imbricata</i>
	L1	0	1.2	5	<i>Entolasia stricta</i> , <i>Schoenus brevifolius</i> , <i>Leptocarpus tenax</i>
Transect 2					
S24T2Q1S19	T	2.5	4.5	1	<i>Corymbia gummifera</i>
	M1	0.5	3.2	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1	10	<i>Lepyrodia scariosa</i> , <i>Chordifex dimorphus</i>
S24T2Q2S19	M1	0.6	3.5	40	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	30	<i>Baloskion gracile</i> , <i>Empodisma minus</i>
S24T2Q3S19	M1	0.5	3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Banksia oblongifolia</i> , <i>Baeckea imbricata</i>
	L1	0	1.2	10	<i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i> , <i>Xanthorrhoea resinosa</i>
S24T2Q4S19	M1	0.5	2.3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	20	<i>Lepidosperma filiforme</i> , <i>Leptocarpus tenax</i> , <i>Empodisma minus</i>
S24T2Q5S19	M1	0.5	3	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Baeckea imbricata</i>
	L1	0	1	15	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
Transect 3					
S24T3Q1S19	T	6.5	6.5	1	<i>Corymbia gummifera</i>
	M1	0.3	2.3	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Kunzea capitata</i> , <i>Hakea teretifolia</i>
	L1	0	1.3	15	<i>Chordifex fastigiatus</i> , <i>Xanthorrhoea resinosa</i>
S24T3Q2S19	M1	0.3	2.2	15	<i>Kunzea capitata</i> , <i>Leucopogon microphyllus</i> var. <i>microphyllus</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
	L1	0	0.6	1	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S24T3Q3S19	M1	0.2	2.2	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Epacris microphylla</i>
	L1	0	0.7	5	<i>Stylidium lineare</i> , <i>Lepyrodia scariosa</i>
S24T3Q4S19	T	3	8	30	<i>Corymbia gummifera</i> , <i>Eucalyptus oblonga</i>
	M1	0.8	1.4	5	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Acacia suaveolens</i>
	L1	0	0.3	5	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

Valley Side Swamp monitoring sites – Spring 2019

Swamp 25 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S25T1Q1S19	T	4.5	4.5	10	<i>Corymbia gummifera</i> , <i>Eucalyptus luehmanniana</i> ▲2RCa
	M1	0.5	3	65	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	5	<i>Empodisma minus</i>
S25T1Q2S19	M1	1.1	2.2	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	30	<i>Xanthorrhoea resinosa</i> , <i>Bauera microphylla</i> , <i>Chordifex dimorphus</i>
S25T1Q3S19	M1	1	3.5	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1	5	<i>Lepidosperma neesii</i> , <i>Empodisma minus</i>
S25T1Q4S19	M1	1.3	4	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.8	5	<i>Schoenus brevifolius</i> , <i>Empodisma minus</i>
S25T1Q5S19	M1	1.2	2.5	30	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Schoenus brevifolius</i>
S25T1Q6S19	M1	0.4	2.5	40	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	5	<i>Chordifex fastigiatus</i> , <i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
S25T1Q7S19	M1	0.8	2.2	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.3	20	<i>Leptocarpus tenax</i> , <i>Ptilothrix deusta</i>
S25T1Q8S19	M1	0.3	3	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	1	<i>Schoenus brevifolius</i>
Transect 2					
S25T2Q1S19	T	8	8	5	<i>Eucalyptus luehmanniana</i> ▲2RCa
	M1	0.7	4	65	<i>Hakea teretifolia</i> , <i>Allocasuarina distyla</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	15	<i>Balioskion gracile</i>
S25T2Q2S19	L1	0	0.6	35	<i>Chordifex fastigiatus</i> , <i>Cyathochaeta diandra</i> , <i>Schoenus brevifolius</i>
S25T2Q3S19	M1	0.7	3.5	75	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	30	<i>Lepyrodia scariosa</i>
S25T2Q4S19	M1	0.5	2.5	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Baekkea imbricata</i> , <i>Hakea teretifolia</i>
	L1	0	1.1	20	<i>Chordifex dimorphus</i> , <i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
Transect 3					
S25T3Q1S19	T	8	8	15	<i>Eucalyptus racemosa</i>
	M1	1	4.5	70	<i>Persoonia pinifolia</i> , <i>Hakea teretifolia</i> , <i>Petrophile pulchella</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 25 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
	L1	0	1.5	10	<i>Empodisma minus</i>
S25T3Q2S19	M1	1.5	4.5	75	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Entolasia stricta</i>
S25T3Q3S19	M1	1.5	3	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	1	<i>Lepidosperma neesii</i> , <i>Entolasia stricta</i> , <i>Ptilothrix deusta</i>
S25T3Q4S19	M1	1	3.2	30	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	20	<i>Lepidosperma neesii</i> , <i>Empodisma minus</i> , <i>Schoenus brevifolius</i>
S25T3Q5S19	M1	0.8	3	55	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	10	<i>Schoenus brevifolius</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

▲ RoTAP species

2: Geographic range in Australia less than 100 km

R: Rare in Australia but does not have an identifiable threat

C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve

a: 1000 plants or more are known to occur within a conservation reserve(s)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S101T1Q1S19	M1	0.3	4	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	10	<i>Empodisma minus</i> , <i>Ptilothrix deusta</i>
S101T1Q2S19	M1	0.7	3.8	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	15	<i>Lepidosperma neesii</i>
S101T1Q3S19	M1	1.5	3	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	10	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S101T1Q4S19	M1	0.6	2.3	75	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.4	5	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S101T1Q5S19	M1	0.5	2.3	70	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	30	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i> , <i>Lepyrodia scariosa</i>
S101T1Q6S19	M1	1	2.5	75	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
S101T1Q7S19	M1	1	2.5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.4	25	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i> , <i>Schoenus brevifolius</i>
S101T1Q8S19	M1	0.6	3	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.3	10	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S101T1Q9S19	M1	0.4	1.7	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.4	40	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S101T1Q10S19	M1	0.2	2.5	40	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.3	20	<i>Lepidosperma filiforme</i> , <i>Lepidosperma neesii</i>
Transect 2					
S101T2Q1S19	M1	0.3	2.1	40	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	10	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S101T2Q2S19	M1	0.2	1.8	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1	15	<i>Lepyrodia scariosa</i> , <i>Lepidosperma neesii</i> , <i>Xanthorrhoea resinosa</i>
S101T2Q3S19	M1	0.6	2.3	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	60	<i>Lepidosperma neesii</i> , <i>Cyathochaeta diandra</i>
S101T2Q4S19	M1	0.4	2.1	30	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	15	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S101T2Q5S19	M1	0.3	2	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
	L1	0	1.3	20	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i> , <i>Leptocarpus tenax</i>
S101T2Q6S19	M1	0.5	2.5	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.8	30	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S101T2Q7S19	M1	0.3	2.3	30	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	70	<i>Lepidosperma neesii</i>
S101T2Q8S19	M1	1	2.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1	40	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S101T2Q9S19	M1	0.1	2.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	15	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
Transect 3					
S101T3Q1S19	M1	0.3	2.5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Epacris microphylla</i>
	L1	0	1.3	25	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S101T3Q2S19	M1	0.5	2	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1.1	50	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Xanthorrhoea resinosa</i>
S101T3Q3S19	M1	1.5	2.3	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	10	<i>Lepidosperma neesii</i> , <i>Xanthorrhoea resinosa</i>
S101T3Q4S19	M1	1	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.2		<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Lepyrodia scariosa</i>
S101T3Q5S19	M1	0.8	3	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	15	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S101T3Q6S19	M1	1	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1	10	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Schoenus brevifolius</i>
S101T3Q7S19	M1	0.6	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1	20	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Lepyrodia scariosa</i>
S101T3Q8S19	M1	1.8	3	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.4	5	<i>Lepidosperma neesii</i> , <i>Empodisma minus</i>
S101T3Q9S19	M1	0.5	2.3	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	5	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S101T3Q10S19	M1	0.8	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Baekkea imbricata</i>
	L1	0	1.1	30	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Lepyrodia scariosa</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S101T3Q11S19	M1	0.2	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.9	15	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Schoenus brevifolius</i>

Legend

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S111aT1Q1S19	M1	0.3	1.5	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Epacris microphylla</i>
	L1	0	0.1	20	<i>Xanthorrhoea resinosa</i> , <i>Lepyrodia scariosa</i> , <i>Leptocarpus tenax</i>
S111aT1Q2S19	M1	0	1.4	15	<i>Petrophile pulchella</i> , <i>Epacris microphylla</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0.5	2	50	<i>Xanthorrhoea resinosa</i> , <i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i>
S111aT1Q3S19	M1	0.3	1.5	75	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea gibbosa</i> , <i>Petrophile pulchella</i>
	L1	0	1.2	20	<i>Chordifex fastigiatus</i> , <i>Leptocarpus tenax</i> , <i>Actinotus minor</i>
S111aT1Q4S19	M1	0.4	2.3	40	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	10	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S111aT1Q5S19	M1	0.4	1.4	30	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.5	10	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S111aT1Q6S19	T	4	5.5	20	<i>Eucalyptus sieberi</i>
	M1	0.6	3	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1.2	10	<i>Lepyrodia scariosa</i> , <i>Lepidosperma neesii</i> , <i>Entolasia stricta</i>
Transect 2					
S111aT2Q1S19	T	5	5	5	<i>Corymbia gummifera</i> , <i>Eucalyptus racemosa</i>
	M1	0.5	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1.4	20	<i>Empodisma minus</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S111aT2Q2S19	M1	0.8	2.4	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Epacris obtusifolia</i>
	L1	0	1.2	1	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S111aT2Q3S19	M1	1.1	2.5	55	<i>Leptospermum squarrosum</i> , <i>Baeckea imbricata</i> , <i>Hakea teretifolia</i>
	L1	0	0.9	5	<i>Chordifex fastigiatus</i> , <i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S111aT2Q4S19	M1	1	2.2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	5	<i>Chordifex fastigiatus</i> , <i>Lepidosperma neesii</i>
S111aT2Q5S19	T	8	8	5	<i>Eucalyptus haemastoma</i>
	M1	1	2.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	0.5	10	<i>Chordifex fastigiatus</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
Transect 3					
S111aT3Q1S19	T	8	8	10	<i>Eucalyptus sieberi</i>
	M1	0.5	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptomeria acida</i> , <i>Hakea gibbosa</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
	L1	0	1	25	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
S111aT3Q2S19	M1	0.5	1.6	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Banksia oblongifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1	10	<i>Chordifex dimorphus</i> , <i>Lepidosperma filiforme</i> , <i>Cyathochaeta diandra</i>
S111aT3Q3S19	M1	1.5	3	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1.2	30	<i>Empodisma minus</i> , <i>Ptilothrix deusta</i>
S111aT3Q4S19	M1	0.5	3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	0.4	10	<i>Cyathochaeta diandra</i> , <i>Empodisma minus</i> , <i>Schoenus brevifolius</i>
S111aT3Q5S19	M1	0.5	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	0.4	10	<i>Bauera microphylla</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S125T1Q1S19	M1	0.2	4	75	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	30	<i>Chordifex fastigiatus</i> , <i>Actinotus minor</i>
S125T1Q2S19	M1	0	2	15	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.5	5	<i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i> , <i>Cyathochaeta diandra</i>
S125T1Q3S19	M1	0.5	2	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Epacris microphylla</i> , <i>Isopogon anethifolius</i>
	L1	0	1.1	10	<i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i>
S125T1Q4S19	M1	0.4	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Isopogon anethifolius</i> , <i>Epacris microphylla</i>
	L1	0	1.2	40	<i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i> , <i>Ptilothrix deusta</i>
S125T1Q5S19	M1	0.2	1.6	35	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i> , <i>Lepyrodia scariosa</i>
S125T1Q6S19	M1	0.5	2	50	<i>Banksia marginata</i> , <i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	40	<i>Chordifex dimorphus</i> , <i>Lepidosperma filiforme</i>
S125T1Q7S19	M1	0.3	1.6	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Banksia marginata</i>
	L1	0	1.2	20	<i>Chordifex dimorphus</i>
Transect 2					
S125T2Q1S19	M1	1	2.5	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Chordifex fastigiatus</i> , <i>Lepidosperma filiforme</i> , <i>Lepidosperma neesii</i>
S125T2Q2S19	M1	1	2.2	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1	10	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i> , <i>Lepidosperma filiforme</i>
S125T2Q3S19	M1	1	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	1	<i>Schoenus brevifolius</i> , <i>Chordifex fastigiatus</i> , <i>Epacris obtusifolia</i>
S125T2Q4S19	M1	0.3	2	80	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.3	20	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i> , <i>Schoenus brevifolius</i>
S125T2Q5S19	M1	0.8	2	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.4	10	<i>Lepidosperma filiforme</i> , <i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
S125T2Q6S19	M1	0.7	2.2	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.3	20	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i> , <i>Chordifex fastigiatus</i>
S125T2Q7S19	M1	1.2	5	70	<i>Hakea dactyloides</i> , <i>Allocasuarina distyla</i>
	L1	0	1.5	30	<i>Chordifex dimorphus</i> , <i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S125T2Q8S19	M1	0.7	2.5	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1.3	25	<i>Xanthorrhoea resinosa</i>
Transect 3					
S125T3Q1S19	T	4	4	10	<i>Eucalyptus racemosa</i>
	M1	0.7	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	0.8	40	<i>Empodisma minus</i> , <i>Cyathochaeta diandra</i>
S125T3Q2S19	M1	1	2.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	0.7	1	<i>Empodisma minus</i> , <i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S125T3Q3S19	M1	1.5	2.8	40	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.5	5	<i>Ptilothrix deusta</i> , <i>Empodisma minus</i> , <i>Schoenus brevifolius</i>
S125T3Q4S19	M1	1	3	85	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Isopogon anethifolius</i>
	L1	0	1	1	<i>Schoenus brevifolius</i> , <i>Lepidosperma filiforme</i> , <i>Lepyrodia scariosa</i>
S125T3Q5S19	M1	1	2.5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Isopogon anethifolius</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.8	20	<i>Ptilothrix deusta</i> , <i>Xanthorrhoea resinosa</i> , <i>Empodisma minus</i>
S125T3Q6S19	M1	1.5	3	50	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.6	5	<i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i> , <i>Empodisma minus</i>
S125T3Q7S19	M1	1	4	50	<i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma filiforme</i> , <i>Cyathochaeta diandra</i>
S125T3Q8S19	T	10	10	20	<i>Eucalyptus racemosa</i>
	M1	1.5	2.5	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1	5	<i>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i> , <i>Lepyrodia scariosa</i>
S125T3Q9S19	T	8	8	40	<i>Eucalyptus racemosa</i>
	M1	0.3	2.5	80	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Isopogon anethifolius</i>
	L1	0	1.5	30	<i>Lepyrodia scariosa</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

*Estimated cover/abundance data – Valley side
swamps*

Valley Side Swamp monitoring sites – Spring 2019

Swamp 16 – Vegetation cover/abundance

Family	Species	Transect 1				Transect 2			Transect 3				
		S16T1Q1S19	S16T1Q2S19	S16T1Q3S19	S16T1Q4S19	S16T2Q1S19	S16T2Q2S19	S16T2Q3S19	S16T3Q1S19	S16T3Q2S19	S16T3Q3S19	S16T3Q4S19	S16T3Q5S19
Apiaceae	<i>Actinotus minor</i>	1	1	1	1		1		2	1		1	1
	<i>Platysace linearifolia</i>										2	1	1
	<i>Xanthosia pilosa</i>					1	2		2				
	<i>Xanthosia tridentata</i>										1	1	3
Casuarinaceae	<i>Allocasuarina littoralis</i>		1		1							4	
Cyperaceae	<i>Cyathochaeta diandra</i>							2		3			
	<i>Lepidosperma filiforme</i>	3	2	3	3						2	4	3
	<i>Lepidosperma laterale</i>					3	4						
	<i>Lepidosperma neesii</i>	2	3							2			
	<i>Ptilothrix deusta</i>	2	2	3	3	3	3	3	2	3	3	3	3
	<i>Schoenus brevifolius</i>		1	3	2				3	1			2
	<i>Schoenus ericetorum</i>	2						1					
	<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i>											1	
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	2	1	3	2	1				1	1		
Droseraceae	<i>Drosera peltata</i>			1	1								
Ericaceae	<i>Epacris microphylla</i>		1	3	3			2	4	1	3	3	3
	<i>Epacris obtusifolia</i>							1					
	<i>Leucopogon esquamatus</i>						1	1			2		
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	4	2	3	1		1	3	1	1	2	3	2
	<i>Styphelia tubiflora</i>							1		1		1	
Euphorbiaceae	<i>Micrantheum ericoides</i>							1					
Fabaceae (Faboideae)	<i>Daviesia corymbosa</i>					2							
	<i>Dillwynia retorta</i>							4					
	<i>Gompholobium glabratum</i>							1					
	<i>Mirbelia rubiifolia</i>			1				1					
	++ <i>Pultenaea aristata</i> ▲2V			5	1								2
	<i>Pultenaea stipularis</i>							1					

Valley Side Swamp monitoring sites – Spring 2019

Swamp 16 – Vegetation cover/abundance

Family	Species	Transect 1				Transect 2			Transect 3				
		S16T1Q1S19	S16T1Q2S19	S16T1Q3S19	S16T1Q4S19	S16T2Q1S19	S16T2Q2S19	S16T2Q3S19	S16T3Q1S19	S16T3Q2S19	S16T3Q3S19	S16T3Q4S19	S16T3Q5S19
	<i>Pultenaea tuberculata</i>	1		1			1	2					
Goodeniaceae	<i>Dampiera stricta</i>	1	1	1	1		1	1	1	1	1	1	1
Haloragaceae	<i>Gonocarpus tetragynus</i>		1							1		1	
Iridaceae	<i>Patersonia sericea</i>					2							
Lauraceae	<i>Cassytha glabella</i>	1		1	1					1			1
Lindsaeaceae	<i>Lindsaea linearis</i>				1		2	3			1	2	
Lomandraceae	<i>Lomandra glauca</i>						3						
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>					2							
	<i>Lomandra obliqua</i>	3		1				1			1	2	1
Myrtaceae	<i>Angophora hispida</i>		1			4				4		4	1
	<i>Baeckea imbricata</i>				2								
	<i>Eucalyptus oblonga</i>	4				2							
	<i>Eucalyptus racemosa</i>								5				
	<i>Kunzea capitata</i>		1	5	3			1		2	2	1	3
	<i>Leptospermum arachnoides</i>								1			1	
	<i>Leptospermum squarrosum</i>	4	4	3		1		4	5	1	4		4
	<i>Leptospermum trinervium</i>		1	4		2	1		1	1			
Poaceae	<i>Anisopogon avenaceus</i>									1			
	<i>Entolasia stricta</i>							3	1				
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	5	3	3		4	5	5	4	3	4	5
	<i>Grevillea oleoides</i>	1						1					
	<i>Hakea dactyloides</i>	1	1	1					2		1		1
	<i>Hakea teretifolia</i>		1	4	1				1		2	4	2
	<i>Isopogon anemonifolius</i>				1								
	<i>Isopogon anethifolius</i>	1											
	<i>Lambertia formosa</i>			4									
	<i>Persoonia pinifolia</i>											1	1

Valley Side Swamp monitoring sites – Spring 2019

Swamp 16 – Vegetation cover/abundance

Family	Species	Transect 1				Transect 2			Transect 3				
		S16T1Q1S19	S16T1Q2S19	S16T1Q3S19	S16T1Q4S19	S16T2Q1S19	S16T2Q2S19	S16T2Q3S19	S16T3Q1S19	S16T3Q2S19	S16T3Q3S19	S16T3Q4S19	S16T3Q5S19
	<i>Petrophile pulchella</i>	1		1	1	1	1	4		1	2	1	3
	<i>Petrophile sessilis</i>									1			
Restionaceae	<i>Chordifex dimorphus</i>	3	1	4	4							1	4
	<i>Chordifex fastigiatus</i>				2								
	<i>Leptocarpus tenax</i>			2	1								
	<i>Lepyrodia scariosa</i>	3	3	2	1			3	3	3	3	4	2
Rutaceae	<i>Boronia parviflora</i>	2											
Stylidiaceae	<i>Stylidium lineare</i>	3		1	1							1	1
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>			1	4			4	4	1	3		4
Xyridaceae	<i>Xyris gracilis</i>											1	
Total		22	20	27	25	12	13	25	17	22	19	25	24

Cover Abundance Scale (Modified Braun Blanquet)

- 1 = cover less than 5% of site and rare
 2 = cover less than 5% of site and uncommon
 3 = cover of less than 5% and common
 4 = cover of 5-20% of site
 5 = cover of 21-50% of site
 6 = cover of 51-75% of site
 7 = cover of greater than 75%

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
 V: Taxon not presently Endangered, but at risk over a longer period

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation cover/abundance

		Transect 1			Transect 2							Transect 3					
Family	Species	S17T1Q1S19	S17T1Q2S19	S17T1Q3S19	S17T2Q1S19	S17T2Q2S19	S17T2Q3S19	S17T2Q4S19	S17T2Q5S19	S17T2Q6S19	S17T2Q7S19	S17T3Q1S19	S17T3Q2S19	S17T3Q3S19	S17T3Q4S19	S17T3Q5S19	S17T3Q6S19
Apiaceae	<i>Actinotus minor</i>			2	2						2	2	3		1	1	
	<i>Platysace linearifolia</i>												3		3	1	
	<i>Xanthosia pilosa</i>							3	1				1				
	<i>Xanthosia tridentata</i>					1									1		
Casuarinaceae	<i>Allocasuarina littoralis</i>	1										3					
Colchicaceae	<i>Burchardia umbellata</i>															1	
Cyperaceae	<i>Cyathochaeta diandra</i>	3	2	1								1	2				
	<i>Lepidosperma filiforme</i>		4	2	2	3	3	3	4			4	4		5	5	
	<i>Lepidosperma neesii</i>					2		2			2				1		
	<i>Ptilothrix deusta</i>	1	3		2	3	1	2			2	3	2	2	1		2
	<i>Schoenus brevifolius</i>										2	1	1			1	
Dilleniaceae	<i>Hibbertia riparia</i>				1	3			4	1	1						
	<i>Hibbertia serpyllifolia</i>			1				4									
Droseraceae	<i>Drosera peltata</i>				1												
Ericaceae	<i>Epacris microphylla</i>	1	1	4		2	3	1	1		1			1			1
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>		3	1	1	3	1			1	1	2		1			
	<i>Monotoca scoparia</i>	3										1					
	<i>Styphelia tubiflora</i>							1									
	<i>Woolisia pungens</i>	1															
Fabaceae (Faboideae)	<i>Bossiaea scolopendria</i>		1				1			2	1						
	<i>Daviesia corymbosa</i>			1													
	<i>Dillwynia retorta</i>											3					
	<i>Gompholobium glabratum</i>			1	1												
	<i>Mirbelia rubiifolia</i>		3	1				1									
	++ <i>Pultenaea aristata</i> ▲2V		1	1	3	4	3			2							
	<i>Pultenaea stipularis</i>											1	3		1	1	
	<i>Pultenaea tuberculata</i>		1	1	1												

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation cover/abundance

		Transect 1			Transect 2						Transect 3						
Family	Species	S17T1Q1S19	S17T1Q2S19	S17T1Q3S19	S17T2Q1S19	S17T2Q2S19	S17T2Q3S19	S17T2Q4S19	S17T2Q5S19	S17T2Q6S19	S17T2Q7S19	S17T3Q1S19	S17T3Q2S19	S17T3Q3S19	S17T3Q4S19	S17T3Q5S19	S17T3Q6S19
Fabaceae (Mimosoideae)	<i>Acacia suaveolens</i>						1										
Goodeniaceae	<i>Dampiera stricta</i>		1			2	1		1								
Haloragaceae	<i>Gonocarpus tetragynus</i>							1					1				
Iridaceae	<i>Patersonia sericea</i>														1	1	
Lauraceae	<i>Cassytha glabella</i>	1										1					
Lomandraceae	<i>Lomandra cylindrica</i>														1		
	<i>Lomandra filiformis</i>															1	
	<i>Lomandra glauca</i>			1								1	2				
	<i>Lomandra obliqua</i>			1					1						3	2	
Myrtaceae	<i>Angophora hispida</i>									3			4	5	5	5	
	<i>Baeckea imbricata</i>				3		2		1								
	<i>Calytrix tetragona</i>			1	4		2		4	1	1			4			5
	<i>Darwinia diminuta</i> ▲2RCi				1	2	1			1		1					
	<i>Eucalyptus oblonga</i>						4	5				4					
	<i>Eucalyptus racemosa</i>					5											
	<i>Eucalyptus</i> spp.	1															
	<i>Kunzea capitata</i>		1	4	3	2			3	4	1			3			2
	<i>Leptospermum arachnoides</i>			1			1				4			1			1
	<i>Leptospermum squarrosum</i>	1	3		3	3	4		2	1	4		1	3			1
	<i>Leptospermum trinervium</i>	1				1	1						5				
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	4	4	3	5	5	1	5	5	4	4	1	1	4	4	
	<i>Banksia marginata</i>			1				6									
	<i>Grevillea oleoides</i>	2		1			1										
	<i>Hakea dactyloides</i>			1									4				
	<i>Hakea teretifolia</i>		1							4				4			
	<i>Isopogon anemonifolius</i>	1		1	1												
	<i>Lambertia formosa</i>								4								

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation cover/abundance

		Transect 1			Transect 2						Transect 3						
Family	Species	S17T1Q1S19	S17T1Q2S19	S17T1Q3S19	S17T2Q1S19	S17T2Q2S19	S17T2Q3S19	S17T2Q4S19	S17T2Q5S19	S17T2Q6S19	S17T2Q7S19	S17T3Q1S19	S17T3Q2S19	S17T3Q3S19	S17T3Q4S19	S17T3Q5S19	S17T3Q6S19
	<i>Petrophile pulchella</i>	3	5	4	4	3	4	1	1	1	4	1	1				1
Restionaceae	<i>Baloskion gracile</i>			1													
	<i>Chordifex dimorphus</i>		2	4	1	1	1	3	3	5	1						
	<i>Chordifex fastigiatus</i>				4	4	2		4		4						
	<i>Lepyrodi scariosa</i>				3	2	3	2		1	3	3		3			4
Rutaceae	<i>Boronia ledifolia</i>														1	1	
Stylidiaceae	<i>Stylidium lineare</i>			1	1		1	1									
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	1	2	1				1		4		1	3		1	1	
Total		15	17	26	21	19	22	17	15	15	17	18	17	11	14	13	8

Cover Abundance Scale (Modified Braun Blanquet)

- 1 = cover less than 5% of site and rare
 2 = cover less than 5% of site and uncommon
 3 = cover of less than 5% and common
 4 = cover of 5-20% of site
 5 = cover of 21-50% of site
 6 = cover of 51-75% of site
 7 = cover of greater than 75%

▲ **RoTAP species**

- 2: Geographic range in Australia less than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 V: Taxon not presently Endangered, but at risk over a longer period
 i: less than 1000 plants are known to occur within a conservation reserve(s)

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Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation cover/abundance

		Transect 1									Transect 2									Transect 3					
Family	Species	S18T1Q1S19	S18T1Q2S19	S18T1Q3S19	S18T1Q4S19	S18T1Q5S19	S18T1Q6S19	S18T1Q7S19	S18T1Q8S19	S18T1Q9S19	S18T2Q1S19	S18T2Q2S19	S18T2Q3S19	S18T2Q4S19	S18T2Q5S19	S18T2Q6S19	S18T2Q7S19	S18T2Q8S19	S18T2Q9S19	S18T2Q10S1	S18T3Q1S19	S18T3Q2S19	S18T3Q3S19	S18T3Q4S19	S18T3Q5S19
Anthericaceae	<i>Thysanotus juncifolius</i>																								1
Apiaceae	<i>Actinotus minor</i>	2		1				2	1	2	1	2	2	1	1		1	2		2		2			2
	<i>Xanthosia tridentata</i>	1					1				1														
Casuarinaceae	<i>Allocasuarina distyla</i>	4								1															
	<i>Allocasuarina littoralis</i>			1					1								1							1	
Colchicaceae	<i>Burchardia umbellata</i>																								1
Cunoniaceae	<i>Bauera microphylla</i>						2									3	4	3		3					
	<i>Bauera rubioides</i>																			1					
Cyperaceae	<i>Lepidosperma filiforme</i>							1					1	1	1	2		1		2		1	1	3	4
	<i>Lepidosperma neesii</i>													1		1	1		3				1	1	
	<i>Ptilothrix deusta</i>			3	3		2	3	2	3	2	3	3	3	3	2	3	2	3	3	1	3	3	2	1
	<i>Schoenus brevifolius</i>					1	2									1			1	1			1		
Dilleniaceae	<i>Hibbertia riparia</i>		3	1	1	2	2	2	2	3		2	2	1	2							1			
	<i>Hibbertia serpyllifolia</i>	4		1		1		1			2		2									1			
Droseraceae	<i>Drosera peltata</i>					1							1						3		1	1	2		
	<i>Drosera spatulata</i>																		1						
Ericaceae	<i>Epacris microphylla</i>	3	3					2		3	2	1	3	4		2		1		2	1	4	2	2	2
	<i>Epacris obtusifolia</i>						2	1									3	2							
	<i>Leucopogon esquamatus</i>										1									1				1	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	3	2	3	3				1	2	3		3	4						1	3	3	2		
Fabaceae (Faboideae)	<i>Bossiaea scolopendria</i>						1																	1	
	<i>Gompholobium glabratum</i>												1										1	1	
	++ <i>Pultenaea aristata</i> ▲2V					1	4	1	3	2	1		2	4	2	1				4	1	3	2	3	1
Fabaceae (Mimosoideae)	<i>Acacia linifolia</i>																				1				
Goodeniaceae	<i>Dampiera stricta</i>						2			1		2	1							2		1			

Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation cover/abundance

		Transect 1								Transect 2								Transect 3								
Family	Species	S18T1Q1S19	S18T1Q2S19	S18T1Q3S19	S18T1Q4S19	S18T1Q5S19	S18T1Q6S19	S18T1Q7S19	S18T1Q8S19	S18T1Q9S19	S18T2Q1S19	S18T2Q2S19	S18T2Q3S19	S18T2Q4S19	S18T2Q5S19	S18T2Q6S19	S18T2Q7S19	S18T2Q8S19	S18T2Q9S19	S18T2Q10S19	S18T3Q1S19	S18T3Q2S19	S18T3Q3S19	S18T3Q4S19	S18T3Q5S19	
Lauraceae	Cassytha glabella				2	1	1	1									1							1		
Lomandraceae	Lomandra obliqua										1															
Myrtaceae	Baeckea imbricata		1	2	2	2	3	3	2	3	2	2	2	4	3		4	3	4				2			
	Callistemon citrinus																			4						
	Calytrix tetragona			2							4	2	1		1											
	Corymbia gummifera	4																								
	Darwinia diminuta ▲2RCi	1	1						1		1	1	1	1			1									
	Eucalyptus luehmanniana ▲2RCa							1																		
	Eucalyptus racemosa	1																								
	Kunzea capitata	4	3	3	4	4	4	2		4	3	3	3	3	2				3	2	3	3	4	2	1	2
	Leptospermum arachnoides							1		3		2	1													
	Leptospermum squarrosum	3	2	1	2	2	4	4	3	3	1		3	1	2	4	5	2	4	4	4	4	4	3	4	4
	Leptospermum trinervium										1														1	
Proteaceae	Banksia ericifolia subsp. ericifolia	4	4	4	4	4	4	5	5	5	4		4	5	4	4	4		4	4	4	4	4	3	5	
	Banksia oblongifolia						4						1													
	Grevillea oleoides										1															
	Hakea dactyloides	4			1				1		1															
	Hakea gibbosa	1		1														1					1			
	Hakea teretifolia	1	1		1		1		3	1	1		1	4	4	2			1	1	5			3		
	Isopogon anethifolius	1	2	4	1																1	2		2	1	
	Lambertia formosa											1							1							
	Petrophile pulchella	4	2	4	4	3	2		2	2	3	2	4	2	2	2	3	1	1	1			2	2		
Restionaceae	Baloskion gracile	1																								
	Chordifex dimorphus	4	5	3	1		3				4										1					
	Chordifex fastigiatus		3	2	4	4	4	3	4	4	2	2	4	4	3		4	4	3	3	3	4	3			
	Empodisma minus															3	2									
	Lepyrodia scariosa		1	1	2	2	2	3		2	1	2	3	3	3	2	3	2	3	3	3	3	1	2	3	

Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation cover/abundance

		Transect 1									Transect 2									Transect 3					
Family	Species	\$18T1Q1S19	\$18T1Q2S19	\$18T1Q3S19	\$18T1Q4S19	\$18T1Q5S19	\$18T1Q6S19	\$18T1Q7S19	\$18T1Q8S19	\$18T1Q9S19	\$18T2Q1S19	\$18T2Q2S19	\$18T2Q3S19	\$18T2Q4S19	\$18T2Q5S19	\$18T2Q6S19	\$18T2Q7S19	\$18T2Q8S19	\$18T2Q9S19	\$18T2Q10S19	\$18T3Q1S19	\$18T3Q2S19	\$18T3Q3S19	\$18T3Q4S19	\$18T3Q5S19
Rhamnaceae	<i>Cryptandra ericoides</i>												1												
Stylidiaceae	<i>Stylidium lineare</i>								1	2	1		2					2							
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	4	2			2				3	3	2				2	4	1		4	1			1	
Total		20	15	17	15	14	20	17	15	19	25	15	24	18	14	14	16	15	14	20	15	16	17	19	12

Cover Abundance Scale (Modified Braun Blanquet)

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 4 = cover of 5-20% of site
 5 = cover of 21-50% of site
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- 2: Geographic range in Australia less than 100 km
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 a: 1000 plants or more are known to occur within a conservation reserve(s)
 i: less than 1000 plants are known to occur within a conservation reserve(s)

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Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation cover/abundance

Family	Species	Transect 1						Transect 2					Transect 3			
		S24T1Q1S19	S24T1Q2S19	S24T1Q3S19	S24T1Q4S19	S24T1Q5S19	S24T1Q6S19	S24T2Q1S19	S24T2Q2S19	S24T2Q3S19	S24T2Q4S19	S24T2Q5S19	S24T3Q1S19	S24T3Q2S19	S24T3Q3S19	S24T3Q4S19
Anthericaceae	<i>Thysanotus juncifolius</i>			2												
Apiaceae	<i>Actinotus minor</i>	2	1	2		1		2			1		1			2
	<i>Xanthosia tridentata</i>															1
Casuarinaceae	<i>Allocasuarina</i> spp.										1					
Cunoniaceae	<i>Bauera microphylla</i>			3	3	1			1	2						
	<i>Bauera rubioides</i>				2		1				1					
Cyperaceae	<i>Lepidosperma filiforme</i>			2		1			1	3	4	1	2	1	1	1
	<i>Lepidosperma neesii</i>	2	2									2				1
	<i>Ptilothrix deusta</i>	4	3	2	3		2	1	3	2	3	3		1		2
	<i>Schoenus brevifolius</i>	1	4	2	3	3	3				3	2				
	<i>Schoenus ericetorum</i>															1
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	4	1					3								
Droseraceae	<i>Drosera peltata</i>	1		1										1	1	
Elaeocarpaceae	<i>Tetratheca neglecta</i> ▲3RC-															2
Ericaceae	<i>Epacris microphylla</i>	4	1	3	2	1		2	3				4		3	1
	<i>Epacris obtusifolia</i>	1	1	3	3	3	3	2	3	3		2				
	<i>Leucopogon esquamatus</i>	1	1										1			1
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>							3					3	3	3	1
	<i>Sprengelia incarnata</i>					2				1	1	1				
Fabaceae (Faboideae)	<i>Gompholobium glabratum</i>	1	1					1								
	<i>Mirbelia rubiifolia</i>			1	2			1	1	1		2				
	<i>Pultenaea tuberculata</i>	1						1								
Fabaceae (Mimosoideae)	<i>Acacia linearifolia</i>															1
	<i>Acacia suaveolens</i>															1
Goodeniaceae	<i>Dampiera stricta</i>	2	1	1	1	2	1	2		2						1
Lauraceae	<i>Cassytha glabella</i>	1	1				1		1	1						
Lindsaeaceae	<i>Lindsaea linearis</i>	1			1		1									

Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation cover/abundance

Family	Species	Transect 1						Transect 2					Transect 3			
		S24T1Q1S19	S24T1Q2S19	S24T1Q3S19	S24T1Q4S19	S24T1Q5S19	S24T1Q6S19	S24T2Q1S19	S24T2Q2S19	S24T2Q3S19	S24T2Q4S19	S24T2Q5S19	S24T3Q1S19	S24T3Q2S19	S24T3Q3S19	S24T3Q4S19
Lomandraceae	<i>Lomandra cylindrica</i>									1						3
	<i>Lomandra glauca</i>															2
	<i>Lomandra obliqua</i>		1										2			2
Myrtaceae	<i>Baeckea imbricata</i>		4	2	4	4	3			4	3	4		2	1	
	<i>Corymbia gummifera</i>							1					1			5
	<i>Darwinia diminuta</i> ▲2RCi														1	
	<i>Eucalyptus oblonga</i>															4
	<i>Kunzea capitata</i>	1	4	3	3	1	2	3	3	2	3	1	3	3	3	1
	<i>Leptospermum arachnoides</i>			1						3				2	3	
	<i>Leptospermum polygalifolium</i>			1			1									
	<i>Leptospermum squarrosum</i>	3	1	3	3	4	3	3	3	3	4	4		1	1	1
	<i>Leptospermum trinervium</i>							1					1			
Poaceae	<i>Entolasia stricta</i>	1			1											2
	<i>Tetrarrhena turfosa</i>					1				1						
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	4	5	5	4	5	4	5	5	4	5	4	1	4	1
	<i>Banksia oblongifolia</i>			2		2			4	4						
	<i>Grevillea oleoides</i>														1	1
	<i>Hakea teretifolia</i>	5	4	4	4	1	4	3	4	3	4		4			
	<i>Isopogon anemonifolius</i>		1				1									
	<i>Lambertia formosa</i>							1								
	<i>Petrophile pulchella</i>							1		1	1			1		
	<i>Symphionema paludosum</i>									1						
Restionaceae	<i>Baloskion gracile</i>	4	4	2	2	3			4				3			
	<i>Chordifex dimorphus</i>							3								
	<i>Chordifex fastigiatus</i>				1	4	2		2	4	2	3	3	3		
	<i>Empodisma minus</i>		4	4	4	4	3	2	4	3	3					
	<i>Leptocarpus tenax</i>	4	4	3	3	3	3		3	3	4	1	3			

Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation cover/abundance

Family	Species	Transect 1						Transect 2					Transect 3			
		S24T1Q1S19	S24T1Q2S19	S24T1Q3S19	S24T1Q4S19	S24T1Q5S19	S24T1Q6S19	S24T2Q1S19	S24T2Q2S19	S24T2Q3S19	S24T2Q4S19	S24T2Q5S19	S24T3Q1S19	S24T3Q2S19	S24T3Q3S19	S24T3Q4S19
	<i>Lepyrodia scariosa</i>	1		2		2	2	4	2	2	2	3	3	3	2	2
Stylidiaceae	<i>Stylidium lineare</i>	2	1	2	1	1		2	2	2	3	1	3	2	3	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>		1			1	1		4	3	1		4			4
Xyridaceae	<i>Xyris gracilis</i>			2				2	2							
Total		23	23	25	20	22	19	23	20	25	19	15	17	13	13	25

Cover Abundance Scale (Modified Braun Blanquet)

- 1 = cover less than 5% of site and rare
 2 = cover less than 5% of site and uncommon
 3 = cover of less than 5% and common
 4 = cover of 5-20% of site
 5 = cover of 21-50% of site
 6 = cover of 51-75% of site
 7 = cover of greater than 75%

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
 3: Geographic range in Australia more than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 i: less than 1000 plants are known to occur within a conservation reserve(s)
 -: reserved population size is not accurately known

Valley Side Swamp monitoring sites – Spring 2019

Swamp 25 – Vegetation cover/abundance

Family	Species	Transect 1								Transect 2				Transect 3				
		S25T1Q1S19	S25T1Q2S19	S25T1Q3S19	S25T1Q4S19	S25T1Q5S19	S25T1Q6S19	S25T1Q7S19	S25T1Q8S19	S25T2Q1S19	S25T2Q2S19	S25T2Q3S19	S25T2Q4S19	S25T3Q1S19	S25T3Q2S19	S25T3Q3S19	S25T3Q4S19	S25T3Q5S19
Apiaceae	<i>Actinotus minor</i>		1								2							
Casuarinaceae	<i>Allocasuarina distyla</i>				1				4	4								
Colchicaceae	<i>Burchardia umbellata</i>			1														
Cunoniaceae	<i>Bauera microphylla</i>	1	4	1	1					1		1	4					
Cyperaceae	<i>Cyathochaeta diandra</i>	1	1							1	4		1	2				
	<i>Lepidosperma filiforme</i>				1	1	1					1						
	<i>Lepidosperma neesii</i>			3								2	3	3	2	3	4	2
	<i>Ptilothrix deusta</i>	2	3	2			2	3	1	2	3	2	3	2		2	2	
	<i>Schoenus brevifolius</i>			2	3	4	3	3	2		3	1	3				3	4
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	1								1	1			1				
Ericaceae	<i>Epacris microphylla</i>	1	4							1			4					
	<i>Epacris obtusifolia</i>	1	1		1	2		1	1			1	1					
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>		1								1		1					4
	<i>Gompholobium glabratum</i>										1							
	<i>Mirbelia rubiifolia</i>	1																
	++ <i>Pultenaea aristata</i> ▲2V											1	1					
Goodeniaceae	<i>Dampiera stricta</i>	1			1			1		1	3	1	1				1	1
Lauraceae	<i>Cassytha glabella</i>		1				1	1				1	1					
Myrtaceae	<i>Baeckea imbricata</i>					4	4	1	1		3	4	4					4
	<i>Corymbia gummiifera</i>	1																
	<i>Eucalyptus luehmanniana</i> ▲2RCa	1	1							1								
	<i>Eucalyptus racemosa</i>													4				
	<i>Kunzea capitata</i>		1								1	1	1					
	<i>Leptospermum arachnoides</i>					1					4							
	<i>Leptospermum squarrosum</i>	1	4	1	4	4	4	1	4	4		4	4		5	4	4	5
Poaceae	<i>Entolasia stricta</i>	1									1			2	3	1		
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	5	5	4	4	4	6	4	5		4	5	4	4	5	4	4

Valley Side Swamp monitoring sites – Spring 2019

Swamp 25 – Vegetation cover/abundance

Family	Species	Transect 1								Transect 2				Transect 3				
		S25T1Q1S19	S25T1Q2S19	S25T1Q3S19	S25T1Q4S19	S25T1Q5S19	S25T1Q6S19	S25T1Q7S19	S25T1Q8S19	S25T2Q1S19	S25T2Q2S19	S25T2Q3S19	S25T2Q4S19	S25T3Q1S19	S25T3Q2S19	S25T3Q3S19	S25T3Q4S19	S25T3Q5S19
	<i>Hakea teretifolia</i>	1	4	4	1	5	4	4	4	5		5	4	5		4	4	1
	<i>Persoonia pinifolia</i>	1								4			1	4				
	<i>Petrophile pulchella</i>	5	4	5	4	1	1		1	1	1	1	4	4	2	1	4	4
	<i>Symphionema paludosum</i>					1												
Restionaceae	<i>Baloskion gracile</i>									4	2							
	<i>Chordifex dimorphus</i>		3										4					
	<i>Chordifex fastigiatus</i>						3	1			4	2	4					
	<i>Empodisma minus</i>	3	3	3	3					2				3			3	2
	<i>Leptocarpus tenax</i>	2	2	2		1		3	1	3	1	3	1	2				
	<i>Lepyrodia scariosa</i>				1	1	1	1	1	2	1	3	3	2				3
Stylidiaceae	<i>Stylidium lineare</i>		1	1								1	3					
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>		4	1				1		1	1	1	1	1	1	1		
Total		18	19	13	12	12	11	13	11	18	18	20	24	14	6	8	9	11

Cover Abundance Scale (Modified Braun Blanquet)

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▲ **RoTAP species**

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 V: Taxon not presently Endangered, but at risk over a longer period
 a: 1000 plants or more are known to occur within a conservation reserve(s)

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation cover/abundance

Family	Species	Transect 1										Transect 2										Transect 3									
		S101T1Q1S19	S101T1Q2S19	S101T1Q3S19	S101T1Q4S19	S101T1Q5S19	S101T1Q6S19	S101T1Q7S19	S101T1Q8S19	S101T1Q9S19	S101T1Q10S19	S101T2Q1S19	S101T2Q2S19	S101T2Q3S19	S101T2Q4S19	S101T2Q5S19	S101T2Q6S19	S101T2Q7S19	S101T2Q8S19	S101T2Q9S19	S101T3Q1S19	S101T3Q2S19	S101T3Q3S19	S101T3Q4S19	S101T3Q5S19	S101T3Q6S19	S101T3Q7S19	S101T3Q8S19	S101T3Q9S19	S101T3Q10S19	S101T3Q11S19
Anthericaceae	<i>Thysanotus juncifolius</i>																				1					2					
Apiaceae	<i>Actinotus minor</i>												1	2		2		1			1					1					
Casuarinaceae	<i>Allocasuarina littoralis</i>																			1											
Cunoniaceae	<i>Bauera microphylla</i>									1	2			2	3					3						3	2	1			
	<i>Bauera rubioides</i>	3																													
Cyperaceae	<i>Cyathochaeta diandra</i>	2	2								2	1		4	4	4	4	2	4	4	1										
	<i>Lepidosperma filiforme</i>										4																				
	<i>Lepidosperma neesii</i>	2	4	4	3	4	2	4	4	4	3	4	3	4	4	4	4	4	3	4	4	3	3	4	4	3	4	3	3	4	4
	<i>Ptilothrix deusta</i>	3	3	3	2	3	3	4	3	3	3	3	3	2	3	3	3	3		3	4	2	3	3	3		3	2	2	3	3
	<i>Schoenus brevifolius</i>		1	2	3	3	2	3	3	4	3	4	3	1		3		1	3	3	3		2	3	1	3	3	2	3	4	3
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	1												1	1			1		1						1					
Ericaceae	<i>Epacris microphylla</i>	2									3						1	2	3	4	3										
	<i>Epacris obtusifolia</i>						1		3				2	1	3	3	3		3	3		2	4	1	1	3	3		3	3	
	<i>Leucopogon esquamatus</i>										1				3																
Fabaceae (Faboideae)	<i>Mirbelia rubiifolia</i>													1												1		1			1
	++ <i>Pultenaea aristata</i> ▲2V																1	1	1												
Goodeniaceae	<i>Dampiera stricta</i>									1											2	1				1	1				1
Haloragaceae	<i>Gonocarpus tetragynus</i>																		1												
Lauraceae	<i>Cassytha glabella</i>			1							1	1		2	1	1	1	1			1		1	3		2					1
Myrtaceae	<i>Baeckea imbricata</i>				3	1	3	1	3	3			3		2					2	1	2		3		1			1	4	4
	<i>Darwinia diminuta</i> ▲2RCi																								1	2					
	<i>Leptospermum arachnoides</i>										1																				
	<i>Leptospermum squarrosum</i>	4	4	4	4	4	4	4	5	4	3	5	5	4	3	5	4	4	4	4	4	5	5	4	4	4	4	5	5	4	4
Orchidaceae	<i>Cryptostylis subulata</i>																									1					
Poaceae	<i>Anisopogon avenaceus</i>												1						3												
	<i>Entolasia stricta</i>	1											1				1				1										

Valley Side Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation cover/abundance

Family	Species	Transect 1										Transect 2										Transect 3									
		S101T1Q1S19	S101T1Q2S19	S101T1Q3S19	S101T1Q4S19	S101T1Q5S19	S101T1Q6S19	S101T1Q7S19	S101T1Q8S19	S101T1Q9S19	S101T1Q10S19	S101T2Q1S19	S101T2Q2S19	S101T2Q3S19	S101T2Q4S19	S101T2Q5S19	S101T2Q6S19	S101T2Q7S19	S101T2Q8S19	S101T2Q9S19	S101T3Q1S19	S101T3Q2S19	S101T3Q3S19	S101T3Q4S19	S101T3Q5S19	S101T3Q6S19	S101T3Q7S19	S101T3Q8S19	S101T3Q9S19	S101T3Q10S19	S101T3Q11S19
	<i>Tetrarrhena turfosa</i>																		2								1				
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	5	6	5	4	4	5	4	5	4	4	5	5	4	4	5	1	5	5	4	5	4	5	5	5	5	4	4	5	5
	<i>Banksia oblongifolia</i>			1			1												1											1	
	<i>Hakea teretifolia</i>	3	4	4	5	4	3	4	4	4	4	1	4		3	4	4	1	4	4	1	4	4	4	4	4	1	1	1	2	1
	<i>Persoonia pinifolia</i>																			1											
	<i>Petrophile pulchella</i>	2	3	1		4				3	4	1	1	2	4	4	3	1		3	4	4	3		1	4	3	3			
	<i>Petrophile sessilis</i>								3																						
Restionaceae	<i>Empodisma minus</i>	3										1	2															3			
	<i>Leptocarpus tenax</i>	1		3	1			2				1	1	3	3	3				2		2		2			2			3	
	<i>Lepyrodia scariosa</i>	3	2	3	3	2	2	1	2	2	2	3	3	2	2		3	2	3	3	4	3	3	3	3	3	3	1	3	3	4
Santalaceae	<i>Leptomeria acida</i>																		1												
Stylidiaceae	<i>Stylidium lineare</i>											1	1	1		1		2		1											1
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>																										1				
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>					1							3							3	1	1	4					1			
Total		14	9	11	9	10	10	9	10	12	16	12	18	14	17	12	13	13	17	16	18	14	11	11	9	18	15	12	9	11	12

Cover Abundance Scale (Modified Braun Blanquet)

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▲ **RoTAP species**

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 V: Taxon not presently Endangered, but at risk over a longer period
 i: less than 1000 plants are known to occur within a conservation reserve(s)

++ **Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)**

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation cover/abundance

Family	Species	Transect 1						Transect 2					Transect 3				
		S111aT1Q1S19	S111aT1Q2S19	S111aT1Q3S19	S111aT1Q4S19	S111aT1Q5S19	S111aT1Q6S19	S111aT2Q1S19	S111aT2Q2S19	S111aT2Q3S19	S111aT2Q4S19	S111aT2Q5S19	S111aT3Q1S19	S111aT3Q2S19	S111aT3Q3S19	S111aT3Q4S19	S111aT3Q5S19
Apiaceae	<i>Actinotus minor</i>	1	2	3			2	3					2	1			1
	<i>Platysace linearifolia</i>	1	1				3	2					1				
	<i>Xanthosia pilosa</i>							1									
Casuarinaceae	<i>Allocasuarina littoralis</i>								1								
Colchicaceae	<i>Burchardia umbellata</i>							1								1	
Cunoniaceae	<i>Bauera microphylla</i>				1									1		3	4
Cyperaceae	<i>Cyathochaeta diandra</i>	3	2					2					4	3		4	
	<i>Lepidosperma filiforme</i>		3				1							3	3		1
	<i>Lepidosperma neesii</i>					1	3	3	3	3	2	3	1		3		
	<i>Ptilothrix deusta</i>	2	2	3	1			3	2		2	3	4	3	4		3
	<i>Schoenus brevifolius</i>	3		3			1		1	3	2	2			3	3	3
Dilleniaceae	<i>Hibbertia riparia</i>	1		2									2				
	<i>Hibbertia serpyllifolia</i>							1									
Ericaceae	<i>Epacris microphylla</i>	4	4		3	3	2		4				3	1	1		
	<i>Epacris obtusifolia</i>					1							1	3	3	3	4
	<i>Leucopogon esquamatus</i>			3	1									1			
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	3	2	3													
	<i>Sprengelia incarnata</i>															1	
Fabaceae (Faboideae)	<i>Bossiaea ensata</i>													1			
	<i>Dillwynia floribunda</i>																1
	<i>Gompholobium glabratum</i>	1															
	<i>Mirbelia rubiifolia</i>						2						1		1		
	++ <i>Pultenaea aristata</i> ▲2V			1									1				
Goodeniaceae	<i>Dampiera stricta</i>			1	1									1			
Lauraceae	<i>Cassytha glabella</i>	1	1	1	1			1					1	1	1		1
Lomandraceae	<i>Lomandra obliqua</i>							1									

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation cover/abundance

Family	Species	Transect 1						Transect 2					Transect 3				
		S111aT1Q1S19	S111aT1Q2S19	S111aT1Q3S19	S111aT1Q4S19	S111aT1Q5S19	S111aT1Q6S19	S111aT2Q1S19	S111aT2Q2S19	S111aT2Q3S19	S111aT2Q4S19	S111aT2Q5S19	S111aT3Q1S19	S111aT3Q2S19	S111aT3Q3S19	S111aT3Q4S19	S111aT3Q5S19
Myrtaceae	<i>Baeckea imbricata</i>				2	2				4			1	2	1	2	
	<i>Corymbia gummifera</i>							1									
	<i>Darwinia diminuta</i> ▲2RCi		1														
	<i>Eucalyptus haemastoma</i>											4					
	<i>Eucalyptus racemosa</i>							1									
	<i>Eucalyptus sieberi</i>						4						4				
	<i>Leptospermum arachnoides</i>	1	2		2	4								1			
	<i>Leptospermum squarrosum</i>			1	2		4		5	5	4	4	1	3	4	4	4
	<i>Leptospermum trinervium</i>					1							1				
Poaceae	<i>Entolasia stricta</i>						3	2									
	<i>Tetrarrhena turfosa</i>																1
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	4	5	3		4	5	4		4	5	5	5	4	5	5
	<i>Banksia oblongifolia</i>		1	1										4			
	<i>Banksia serrata</i>						1										
	<i>Grevillea oleoides</i>				1									1			
	<i>Hakea gibbosa</i>	1	2	4	1					4			4				
	<i>Hakea teretifolia</i>		1		1	4		3	1	4	1	4		1	2	4	4
	<i>Persoonia levis</i>				1												
	<i>Petrophile pulchella</i>	4	5	4	4	4	4	4	2	4	1	4	1	3	4	1	4
	<i>Petrophile sessilis</i>												1				
Restionaceae	<i>Chordifex dimorphus</i>													3			
	<i>Chordifex fastigiatus</i>		4	4	4	4			2	4	3	4		2		1	1
	<i>Empodisma minus</i>						2	4							4	3	3
	<i>Leptocarpus tenax</i>	3	1	3	1			2						2		1	
	<i>Lepyrodia scariosa</i>	4			2	3	3	3	2	3	2	3	3	2	2		3
Rutaceae	<i>Boronia parviflora</i>															1	

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation cover/abundance

Family	Species	Transect 1						Transect 2					Transect 3				
		S111aT1Q1S19	S111aT1Q2S19	S111aT1Q3S19	S111aT1Q4S19	S111aT1Q5S19	S111aT1Q6S19	S111aT2Q1S19	S111aT2Q2S19	S111aT2Q3S19	S111aT2Q4S19	S111aT2Q5S19	S111aT3Q1S19	S111aT3Q2S19	S111aT3Q3S19	S111aT3Q4S19	S111aT3Q5S19
Santalaceae	<i>Leptomeria acida</i>												4				
Selaginellaceae	<i>Selaginella uliginosa</i>																1
Stylidiaceae	<i>Stylidium lineare</i>															1	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	4	4	1		1	2	4					4				
Total		17	18	17	18	11	16	20	11	9	9	10	22	23	15	16	17

Cover Abundance Scale (Modified Braun Blanquet)

- 1 = cover less than 5% of site and rare
 2 = cover less than 5% of site and uncommon
 3 = cover of less than 5% and common
 4 = cover of 5-20% of site
 5 = cover of 21-50% of site
 6 = cover of 51-75% of site
 7 = cover of greater than 75%

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
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 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 V: Taxon not presently Endangered, but at risk over a longer period
 i: less than 1000 plants are known to occur within a conservation reserve(s)

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation cover/abundance

		Transect 1							Transect 2							Transect 3									
Family	Species	S125T1Q1S19	S125T1Q2S19	S125T1Q3S19	S125T1Q4S19	S125T1Q5S19	S125T1Q6S19	S125T1Q7S19	S125T2Q1S19	S125T2Q2S19	S125T2Q3S19	S125T2Q4S19	S125T2Q5S19	S125T2Q6S19	S125T2Q7S19	S125T2Q8S19	S125T3Q1S19	S125T3Q2S19	S125T3Q3S19	S125T3Q4S19	S125T3Q5S19	S125T3Q6S19	S125T3Q7S19	S125T3Q8S19	S125T3Q9S19
Apiaceae	<i>Actinotus minor</i>	4		3	2		2	3			1		1	2	2		3				2	1	1		
	<i>Platysace linearifolia</i>		1																						
	<i>Xanthosia tridentata</i>													1											
Casuarinaceae	<i>Allocasuarina distyla</i>	1													4		1								
	<i>Allocasuarina littoralis</i>								1																
Cunoniaceae	<i>Bauera microphylla</i>				3									2											
Cyperaceae	<i>Chorizandra cymbaria</i>										1									1					
	<i>Cyathochaeta diandra</i>	3	2					1							2	2	4					3	3	3	4
	<i>Gahnia sieberiana</i>										1														
	<i>Lepidosperma filiforme</i>		2	4	4	3	3	1	3	3	3		4	3			1			3			3		
	<i>Lepidosperma neesii</i>	2			1				3	2		2	3	1		1	1	3			3				
	<i>Ptilothrix deusta</i>	2			3	3	3	1				1	3	3	3	1	2	3	3		4	3	3	3	3
	<i>Schoenus brevifolius</i>					3				1	3	4		2				1	3	3	1				
	<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i>				2		1	1																	
Dilleniaceae	<i>Hibbertia riparia</i>							1																	
	<i>Hibbertia serpyllifolia</i>			1												2	1								4
Ericaceae	<i>Epacris microphylla</i>		1	4		4		1					1		1		1	1						3	1
	<i>Epacris obtusifolia</i>						1			1	3			1											
	<i>Leucopogon esquamatus</i>				3			1																	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	2		1			3	1									1								1
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	1	1	3	1	2	1		2	2		1		3				2	1	2	2	2	1	1	1
	<i>Mirbelia rubiifolia</i>							2																	
	<i>Pultenaea tuberculata</i>																								1
Goodeniaceae	<i>Dampiera stricta</i>		1				1	2						1			1				1				1
Haloragaceae	<i>Gonocarpus tetragynus</i>													1	1	2									1
Lauraceae	<i>Cassytha glabella</i>	1	1		1			1				1	1	1		1	1	2		1	2	1		1	1

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation cover/abundance

		Transect 1							Transect 2							Transect 3										
Family	Species	S125T1Q1S19	S125T1Q2S19	S125T1Q3S19	S125T1Q4S19	S125T1Q5S19	S125T1Q6S19	S125T1Q7S19	S125T2Q1S19	S125T2Q2S19	S125T2Q3S19	S125T2Q4S19	S125T2Q5S19	S125T2Q6S19	S125T2Q7S19	S125T2Q8S19	S125T3Q1S19	S125T3Q2S19	S125T3Q3S19	S125T3Q4S19	S125T3Q5S19	S125T3Q6S19	S125T3Q7S19	S125T3Q8S19	S125T3Q9S19	
Lindsaeaceae	Lindsaea linearis		1	1	1			2					1			2	1					1				
Lomandraceae	Lomandra obliqua	1					2								1											
Myrtaceae	Angophora hispida						1	1																		
	Baeckea imbricata			3	2	2			1	2	2	1		3						2						
	Darwinia diminuta ▲2RCi	1		1	1		3							1	1											
	Darwinia fascicularis	1			1																					
	Eucalyptus racemosa																4							4	5	
	Leptospermum arachnoides		1	2	2	1							1			1										
	Leptospermum squarrosum		2	1	4	4			4	5	5	5	4	5	4	4	1	4	4	5	4	4	5	4	4	4
	Leptospermum trinervium	4					3	1																		
Pittosporaceae	Billardiera scandens						1																			
Poaceae	Anisopogon avenaceus						2																			
Proteaceae	Banksia ericifolia subsp. ericifolia	5	4	5	5	4	4	5	5	5	5	5	5	5	4	5	5	5	4	5	5	4	4	5	5	
	Banksia marginata						5	4																		
	Banksia oblongifolia				4																					
	Hakea dactyloides														6											
	Hakea gibbosa			1		1	1			1													4	1		
	Hakea teretifolia	4	1	1				1	4	4	1	4			1		1	1	5	1	4	5	4	4	1	
	Isopogon anethifolius	3		4	4	4	1	4	1	1	1		1	1	4		1			4	5	1	4		4	
	Lomatia silaifolia						1																			
	Persoonia pinifolia						5									1								1		
	Petrophile pulchella	2	1			1	2	4	2		2	2			2	5	4	2		1			1			
Restionaceae	Chordifex dimorphus						4	4							5											
	Chordifex fastigiatus	5	4	4	4	3		1	3	4	3	5	3	3		4						2	3		1	
	Empodisma minus								2	3							4	3	3	3	3	2	1			
	Leptocarpus tenax	1	1				1	1								1	1							1	2	

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation cover/abundance

		Transect 1							Transect 2							Transect 3									
Family	Species	S125T1Q1S19	S125T1Q2S19	S125T1Q3S19	S125T1Q4S19	S125T1Q5S19	S125T1Q6S19	S125T1Q7S19	S125T2Q1S19	S125T2Q2S19	S125T2Q3S19	S125T2Q4S19	S125T2Q5S19	S125T2Q6S19	S125T2Q7S19	S125T2Q8S19	S125T3Q1S19	S125T3Q2S19	S125T3Q3S19	S125T3Q4S19	S125T3Q5S19	S125T3Q6S19	S125T3Q7S19	S125T3Q8S19	S125T3Q9S19
	<i>Lepyrodia scariosa</i>	2		2		3		1	1	3	3	4	2			1	4	1	1	3	1		1	2	5
Stylidiaceae	<i>Stylidium lineare</i>		1	2	1	2	1	2						1											
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>										1		1	4	4	5					4		1		
Total		19	16	18	20	15	24	25	13	14	15	12	14	20	16	17	20	12	8	13	14	12	15	13	18

Cover Abundance Scale (Modified Braun Blanquet)

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 2 = cover less than 5% of site and uncommon
 3 = cover of less than 5% and common
 4 = cover of 5-20% of site
 5 = cover of 21-50% of site
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Valley Side Swamp monitoring sites – Spring 2019

Species which recorded an increase in average cover/abundance (from autumn 2019)

Longwall and Control Sites	Longwall Sites Only	Control Sites Only
<i>Allocasuarina distyla</i>	<i>Allocasuarina littoralis</i>	<i>Actinotus minor</i>
<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	<i>Angophora hispida</i>	<i>Anisopogon avenaceus</i>
<i>Bauera microphylla</i>	<i>Baloskion gracile</i> *	<i>Baekea imbricata</i>
<i>Chordifex dimorphus</i>	<i>Banksia marginata</i>	<i>Banksia oblongifolia</i>
<i>Chordifex fastigiatus</i>	<i>Bossiaea scolopendria</i> *	<i>Darwinia diminuta</i> ▲2RCi
<i>Cyathochaeta diandra</i>	<i>Callistemon citrinus</i> *	<i>Eucalyptus haemastoma</i> *
<i>Dampiera stricta</i>	<i>Cassytha glabella</i>	<i>Eucalyptus racemosa</i>
<i>Empodisma minus</i>	<i>Corymbia gummifera</i>	<i>Eucalyptus sieberi</i> *
<i>Entolasia stricta</i>	<i>Daviesia corymbosa</i> *	<i>Gonocarpus tetragynus</i>
<i>Epacris microphylla</i>	<i>Dillwynia retorta</i> *	<i>Hakea gibbosa</i>
<i>Epacris obtusifolia</i>	<i>Eucalyptus oblonga</i> *	<i>Isopogon anethifolius</i>
<i>Hakea dactyloides</i>	<i>Hibbertia riparia</i>	<i>Leptomeria acida</i> *
<i>Hakea teretifolia</i>	<i>Hibbertia serpyllifolia</i>	<i>Petrophile pulchella</i>
<i>Lepidosperma filiiforme</i>	<i>Kunzea capitata</i> *	<i>Petrophile sessilis</i>
<i>Lepidosperma neesii</i>	<i>Lepidosperma laterale</i> *	<i>Pimelea linifolia</i> subsp. <i>linifolia</i> *
<i>Leptocarpus tenax</i>	<i>Lomandra glauca</i> *	<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i>
<i>Leptospermum arachnoides</i>	<i>Lomandra multiflora</i> subsp. <i>multiflora</i> *	<i>Tetrarrhena turfosa</i>
<i>Leptospermum squarrosum</i>	<i>Patersonia sericea</i> *	<i>Xanthosia tridentata</i>
<i>Leptospermum trinervium</i>	<i>Persoonia pinifolia</i>	
<i>Lepyrodia scariosa</i>	++ <i>Pultenaea aristata</i> ▲2V	
<i>Leucopogon esquamatus</i>	<i>Sprengelia incarnata</i>	
<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	<i>Stylidium lineare</i>	
<i>Lomandra obliqua</i>	<i>Xyris gracilis</i> *	
<i>Mirbelia rubiifolia</i>		
<i>Ptilothrix deusta</i>		
<i>Schoenus brevifolius</i>		
<i>Thysanotus juncifolius</i>		
<i>Xanthorrhoea resinosa</i>		
<i>Xanthosia pilosa</i>		

* Species only recorded in either longwall or control sites, spring 2019.

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Valley Side Swamp monitoring sites – Spring 2019

Species which recorded a decrease in average cover/abundance (from autumn 2019)

Longwall and Control Sites	Longwall Sites Only	Control Sites Only
<i>Actinotus minor</i>	<i>Acacia suaveolens</i> *	<i>Allocasuarina littoralis</i>
<i>Baeckea imbricata</i>	<i>Banksia oblongifolia</i>	<i>Anisopogon avenaceus</i>
<i>Cassytha glabella</i>	<i>Bauera microphylla</i>	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
<i>Chordifex fastigiatus</i>	<i>Bauera rubioides</i>	<i>Dillwynia floribunda</i>
<i>Cyathochaeta diandra</i>	<i>Burchardia umbellata</i>	<i>Leptocarpus tenax</i>
<i>Dampiera stricta</i>	<i>Calytrix tetragona</i> *	<i>Leptospermum arachnoides</i>
<i>Darwinia diminuta</i> ▲2RCi	<i>Chordifex dimorphus</i>	<i>Persoonia pinifolia</i>
<i>Empodisma minus</i>	<i>Corymbia gummifera</i>	
<i>Epacris microphylla</i>	<i>Epacris obtusifolia</i>	
<i>Hakea gibbosa</i>	<i>Eucalyptus luehmanniana</i> ▲2RCa*	
<i>Hakea teretifolia</i>	<i>Eucalyptus racemosa</i>	
<i>Hibbertia riparia</i>	<i>Gompholobium glabratum</i>	
<i>Hibbertia serpyllifolia</i>	<i>Hakea dactyloides</i>	
<i>Lepidosperma neesii</i>	<i>Isopogon anemonifolius</i> *	
<i>Leptospermum trinervium</i>	<i>Kunzea capitata</i> *	
<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	<i>Lepidosperma filiforme</i>	
<i>Mirbelia rubiifolia</i>	<i>Leptospermum squarrosum</i>	
<i>Petrophile pulchella</i>	<i>Lepyrodia scariosa</i>	
<i>Platysace linearifolia</i>	<i>Lindsaea linearis</i>	
<i>Ptilothrix deusta</i>	<i>Lomandra cylindrica</i> *	
++ <i>Pultenaea aristata</i> ▲2V	<i>Lomandra glauca</i> *	
<i>Schoenus brevifolius</i>	<i>Lomandra obliqua</i>	
<i>Stylidium lineare</i>	<i>Monotoca scoparia</i> *	
	<i>Pultenaea stipularis</i> *	
	<i>Pultenaea tuberculata</i>	
	<i>Styphelia tubiflora</i> *	
	<i>Symphionema paludosum</i> *	
	<i>Xanthorrhoea resinosa</i>	
	<i>Xanthosia tridentata</i>	
	<i>Xyris gracilis</i> *	

* Species only recorded in either longwall or control sites, spring 2019.

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i: less than 1000 plants are known to occur within a conservation reserve(s)

a: 1000 plants or more are known to occur within a conservation reserve(s)

++ Species listed as Vulnerable under NSW Threatened Species Conservation Act (1995) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Vegetation condition – Valley side swamps

Valley Side Swamp monitoring sites – Spring 2019

Swamp 16 – Vegetation condition

Family	Species	Transect 1				Transect 2			Transect 3				
		S16T1Q1S19	S16T1Q2S19	S16T1Q3S19	S16T1Q4S19	S16T2Q1S19	S16T2Q2S19	S16T2Q3S19	S16T3Q1S19	S16T3Q2S19	S16T3Q3S19	S16T3Q4S19	S16T3Q5S19
Apiaceae	<i>Actinotus minor</i>	5	5	5	5		5		5	5		5	5
	<i>Platysace linearifolia</i>										5	5	5
	<i>Xanthosia pilosa</i>					5	5		5				
	<i>Xanthosia tridentata</i>										5	5	5
Casuarinaceae	<i>Allocasuarina littoralis</i>		5		5							5	
Cyperaceae	<i>Cyathochaeta diandra</i>							5		5			
	<i>Lepidosperma filiforme</i>	5	5	5	5						5	5	5
	<i>Lepidosperma laterale</i>					5	5						
	<i>Lepidosperma neesii</i>	5	5							5			
	<i>Ptilothrix deusta</i>	5	5	5	5	5	5	5	5	5	5	5	5
	<i>Schoenus brevifolius</i>		5	5	5				5	5			5
	<i>Schoenus ericetorum</i>	5						5					
	<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i>											5	
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	3	5	5	5	5				5	5		
Droseraceae	<i>Drosera peltata</i>			5	5								
Ericaceae	<i>Epacris microphylla</i>		5	4	5			5	4	5	5	5	5
	<i>Epacris obtusifolia</i>							5					
	<i>Leucopogon esquamatus</i>						4	5			5		
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	5	5	4	5		1	5	5	5	5	5	5
	<i>Styphelia tubiflora</i>							5		5		5	
Euphorbiaceae	<i>Micrantheum ericoides</i>							5					
Fabaceae (Faboideae)	<i>Daviesia corymbosa</i>					5							
	<i>Dillwynia retorta</i>							4					
	<i>Gompholobium glabratum</i>							5					
	<i>Mirbelia rubiifolia</i>			5				4					
	++ <i>Pultenaea aristata</i> ▲2V			5	5								4
	<i>Pultenaea stipularis</i>							5					

Valley Side Swamp monitoring sites – Spring 2019

Swamp 16 – Vegetation condition

Family	Species	Transect 1				Transect 2			Transect 3				
		S16T1Q1S19	S16T1Q2S19	S16T1Q3S19	S16T1Q4S19	S16T2Q1S19	S16T2Q2S19	S16T2Q3S19	S16T3Q1S19	S16T3Q2S19	S16T3Q3S19	S16T3Q4S19	S16T3Q5S19
	<i>Pultenaea tuberculata</i>	5		5			5	5					
Goodeniaceae	<i>Dampiera stricta</i>	5	5	5	5		5	4	5	5	5	5	5
Haloragaceae	<i>Gonocarpus tetragynus</i>		5							5		5	
Iridaceae	<i>Patersonia sericea</i>					5							
Lauraceae	<i>Cassytha glabella</i>	4		5	3					5			5
Lindsaeaceae	<i>Lindsaea linearis</i>				5		5	5			5	5	
Lomandraceae	<i>Lomandra glauca</i>						5						
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>					5							
	<i>Lomandra obliqua</i>	5		5				5			5	5	5
Myrtaceae	<i>Angophora hispida</i>		5			5				5		5	5
	<i>Baeckea imbricata</i>				5								
	<i>Eucalyptus oblonga</i>	5				5							
	<i>Eucalyptus racemosa</i>								5				
	<i>Kunzea capitata</i>		5	5	5			5		5	5	5	5
	<i>Leptospermum arachnoides</i>								5			5	
	<i>Leptospermum squarrosum</i>	5	5	5		5		5	5	5	5		5
	<i>Leptospermum trinervium</i>		5	5		5	5		5	5			
Poaceae	<i>Anisopogon avenaceus</i>									5			
	<i>Entolasia stricta</i>							5	5				
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5	5		4	5	5	5	5	5	5
	<i>Grevillea oleoides</i>	5						5					
	<i>Hakea dactyloides</i>	5	5	5					5		5		5
	<i>Hakea teretifolia</i>		5	5	5				5		5	5	5
	<i>Isopogon anemonifolius</i>				5								
	<i>Isopogon anethifolius</i>	5											
	<i>Lambertia formosa</i>			5									
	<i>Persoonia pinifolia</i>											5	5

Valley Side Swamp monitoring sites – Spring 2019

Swamp 16 – Vegetation condition

Family	Species	Transect 1				Transect 2			Transect 3				
		S16T1Q1S19	S16T1Q2S19	S16T1Q3S19	S16T1Q4S19	S16T2Q1S19	S16T2Q2S19	S16T2Q3S19	S16T3Q1S19	S16T3Q2S19	S16T3Q3S19	S16T3Q4S19	S16T3Q5S19
	<i>Petrophile pulchella</i>	5		5	5	5	4	5		5	5	5	5
	<i>Petrophile sessilis</i>									5			
Restionaceae	<i>Chordifex dimorphus</i>	5	5	5	5							5	5
	<i>Chordifex fastigiatus</i>				5								
	<i>Leptocarpus tenax</i>			5	5								
	<i>Lepyrodia scariosa</i>	5	5	5	5			5	5	5	5	5	5
Rutaceae	<i>Boronia parviflora</i>	5											
Stylidiaceae	<i>Stylidium lineare</i>	5		5	5							5	5
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>			5	5			5	5	5	5		5
Xyridaceae	<i>Xyris gracilis</i>											5	
Total		22	20	27	25	12	13	25	17	22	19	25	24

Condition Scale

1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ RoTAP species

2: Geographic range in Australia less than 100 km
 V: Taxon not presently Endangered, but at risk over a longer period

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation condition

		Transect 1			Transect 2						Transect 3						
Family	Species	S17T1Q1S19	S17T1Q2S19	S17T1Q3S19	S17T2Q1S19	S17T2Q2S19	S17T2Q3S19	S17T2Q4S19	S17T2Q5S19	S17T2Q6S19	S17T2Q7S19	S17T3Q1S19	S17T3Q2S19	S17T3Q3S19	S17T3Q4S19	S17T3Q5S19	S17T3Q6S19
Apiaceae	<i>Actinotus minor</i>			5	5						5	5	5		5	5	
	<i>Platysace linearifolia</i>												4		3	5	
	<i>Xanthosia pilosa</i>							5	5				5				
	<i>Xanthosia tridentata</i>					5									5		
Casuarinaceae	<i>Allocasuarina littoralis</i>	5										5					
Colchicaceae	<i>Burchardia umbellata</i>															5	
Cyperaceae	<i>Cyathochaeta diandra</i>	4	5	5								5	5				
	<i>Lepidosperma filiforme</i>		5	5	5	4	4	4	4			5	4		4	5	
	<i>Lepidosperma neesii</i>					5		5			5				5		
	<i>Ptilothrix deusta</i>	5	5		5	5	5	5			5	5	5	5	5		5
	<i>Schoenus brevifolius</i>										5	5	5			5	
Dilleniaceae	<i>Hibbertia riparia</i>				5	5			5	5	5						
	<i>Hibbertia serpyllifolia</i>			5				5									
Droseraceae	<i>Drosera peltata</i>				5												
Ericaceae	<i>Epacris microphylla</i>	5	5	5		5	5	5	5		5			5			5
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>		5	5	5	5	5			5	5	5		5			
	<i>Monotoca scoparia</i>	5										5					
	<i>Styphelia tubiflora</i>							5									
	<i>Woollsia pungens</i>	5															
Fabaceae (Faboideae)	<i>Bossiaea scolopendria</i>		5				4			5	5						
	<i>Daviesia corymbosa</i>			5													
	<i>Dillwynia retorta</i>											5					
	<i>Gompholobium glabratum</i>			5	5												
	<i>Mirbelia rubiifolia</i>		5	5				5									
	++ <i>Pultenaea aristata</i> ▲2V		5	5	5	4	5			5							
	<i>Pultenaea stipularis</i>											5	5		4	5	
	<i>Pultenaea tuberculata</i>		5	5	5												

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation condition

Family	Species	Transect 1			Transect 2							Transect 3					
		S17T1Q1S19	S17T1Q2S19	S17T1Q3S19	S17T2Q1S19	S17T2Q2S19	S17T2Q3S19	S17T2Q4S19	S17T2Q5S19	S17T2Q6S19	S17T2Q7S19	S17T3Q1S19	S17T3Q2S19	S17T3Q3S19	S17T3Q4S19	S17T3Q5S19	S17T3Q6S19
Fabaceae (Mimosoideae)	<i>Acacia suaveolens</i>						5										
Goodeniaceae	<i>Dampiera stricta</i>		5			5	5		5								
Haloragaceae	<i>Gonocarpus tetragynus</i>							5					5				
Iridaceae	<i>Patersonia sericea</i>														5	5	
Lauraceae	<i>Cassytha glabella</i>	5										5					
Lomandraceae	<i>Lomandra cylindrica</i>														5		
	<i>Lomandra filiformis</i>															5	
	<i>Lomandra glauca</i>			5								5	5				
	<i>Lomandra obliqua</i>			5					5						5	5	
Myrtaceae	<i>Angophora hispida</i>									5			5	5	5	5	
	<i>Baeckea imbricata</i>				4		5		5								
	<i>Calytrix tetragona</i>			5	5		5		5	5	5			5			5
	<i>Darwinia diminuta</i> ▲2RCi				5	5	5			5		5					
	<i>Eucalyptus oblonga</i>						5	5				4					
	<i>Eucalyptus racemosa</i>					5											
	<i>Eucalyptus</i> spp.	5															
	<i>Kunzea capitata</i>		5	5	5	5			5	5	5			5			5
	<i>Leptospermum arachnoides</i>			5			5				5			5			5
	<i>Leptospermum squarrosum</i>	5	5		5	5	5		5	5	5		5	5			5
	<i>Leptospermum trinervium</i>	5				5	5						5				
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	4	5	5	5	4	5	5	5	5	5	5	4	5	5	
	<i>Banksia marginata</i>			5				5									
	<i>Grevillea oleoides</i>	5		5			5										
	<i>Hakea dactyloides</i>			5									5				
	<i>Hakea teretifolia</i>		5							5				4			
	<i>Isopogon anemonifolius</i>	5		5	5												
	<i>Lambertia formosa</i>								5								

Valley Side Swamp monitoring sites – Spring 2019

Swamp 17 – Vegetation condition

		Transect 1			Transect 2						Transect 3						
Family	Species	S17T1Q1S19	S17T1Q2S19	S17T1Q3S19	S17T2Q1S19	S17T2Q2S19	S17T2Q3S19	S17T2Q4S19	S17T2Q5S19	S17T2Q6S19	S17T2Q7S19	S17T3Q1S19	S17T3Q2S19	S17T3Q3S19	S17T3Q4S19	S17T3Q5S19	S17T3Q6S19
	<i>Petrophile pulchella</i>	5	4	5	5	5	5	5	5	5	5	5	5				5
Restionaceae	<i>Baloskion gracile</i>			5													
	<i>Chordifex dimorphus</i>		5	4	5	5	5	4	4	4	5						
	<i>Chordifex fastigiatus</i>				4	3	4		5		5						
	<i>Lepyrodia scariosa</i>				4	5	5	5		5	5	5		5			4
Rutaceae	<i>Boronia ledifolia</i>														4	5	
Stylidiaceae	<i>Stylidium lineare</i>			5	5		5	5									
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	5	5	5				5		4		5	5		5	5	
Total		15	17	26	21	19	22	17	15	15	17	18	17	11	14	13	8

Condition Scale

- 1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 V: Taxon not presently Endangered, but at risk over a longer period
 i: less than 1000 plants are known to occur within a conservation reserve(s)

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation condition

		Transect 1									Transect 2									Transect 3					
Family	Species	S18T1Q1S19	S18T1Q2S19	S18T1Q3S19	S18T1Q4S19	S18T1Q5S19	S18T1Q6S19	S18T1Q7S19	S18T1Q8S19	S18T1Q9S19	S18T2Q1S19	S18T2Q2S19	S18T2Q3S19	S18T2Q4S19	S18T2Q5S19	S18T2Q6S19	S18T2Q7S19	S18T2Q8S19	S18T2Q9S19	S18T2Q10S19	S18T3Q1S19	S18T3Q2S19	S18T3Q3S19	S18T3Q4S19	S18T3Q5S19
Anthericaceae	<i>Thysanotus juncifolius</i>																								5
Apiaceae	<i>Actinotus minor</i>	5		5				5	5	5	5	5	5	5			5	5		5		5			5
	<i>Xanthosia tridentata</i>	5					5				5														
Casuarinaceae	<i>Allocasuarina distyla</i>	5								5															
	<i>Allocasuarina littoralis</i>			5					5								5							5	
Colchicaceae	<i>Burchardia umbellata</i>																								5
Cunoniaceae	<i>Bauera microphylla</i>						5									5	5	5		4					
	<i>Bauera rubioides</i>																			5					
Cyperaceae	<i>Lepidosperma filiforme</i>							5					5	5	4	5		5		5		5	5	5	4
	<i>Lepidosperma neesii</i>												5		5	5		5					5	5	
	<i>Ptilothrix deusta</i>			5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	<i>Schoenus brevifolius</i>					5	5									5			5	5			5		
Dilleniaceae	<i>Hibbertia riparia</i>		4	5	5	5	5	5	5	5		5	5	5	5							5			
	<i>Hibbertia serpyllifolia</i>	5		5		5		5			5		5									5			
Droseraceae	<i>Drosera peltata</i>					5								5					5		5	5	5		
	<i>Drosera spatulata</i>																		5						
Ericaceae	<i>Epacris microphylla</i>	3	4					3		4	4	5	5	5		5		5		5	5	5	5	5	5
	<i>Epacris obtusifolia</i>						5	5									5	5							
	<i>Leucopogon esquamatus</i>										5									5				5	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	5	5	5	5				5	5	5		5	5						5	5	5	5		
Fabaceae (Faboideae)	<i>Bossiaea scolopendria</i>						5																	5	
	<i>Gompholobium glabratum</i>												5										5	5	
	++ <i>Pultenaea aristata</i> ▲2V					5	5	5	5	5	5		5	5	4	5				5	5	5	5	5	5
Fabaceae (Mimosoideae)	<i>Acacia linifolia</i>																				5				
Goodeniaceae	<i>Dampiera stricta</i>						5			5		5	5							5		5			
Lauraceae	<i>Cassytha glabella</i>				5	5	5	5									5							5	
Lomandraceae	<i>Lomandra obliqua</i>										3														

Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation condition

		Transect 1								Transect 2								Transect 3							
Family	Species	\$18T1Q1S19	\$18T1Q2S19	\$18T1Q3S19	\$18T1Q4S19	\$18T1Q5S19	\$18T1Q6S19	\$18T1Q7S19	\$18T1Q8S19	\$18T1Q9S19	\$18T2Q1S19	\$18T2Q2S19	\$18T2Q3S19	\$18T2Q4S19	\$18T2Q5S19	\$18T2Q6S19	\$18T2Q7S19	\$18T2Q8S19	\$18T2Q9S19	\$18T2Q10S1	\$18T3Q1S19	\$18T3Q2S19	\$18T3Q3S19	\$18T3Q4S19	\$18T3Q5S19
Myrtaceae	<i>Baeckea imbricata</i>		5	5	4	5	3	4	5	5	4	5	5	5	5		5	4	5				5		
	<i>Callistemon citrinus</i>																			5					
	<i>Calytrix tetragona</i>			5							5	5	5		5										
	<i>Corymbia gummifera</i>	5																							
	<i>Darwinia diminuta</i> ▲2RCi	5	5						5		5	5	5	5			5								
	<i>Eucalyptus luehmanniana</i> ▲2RCa							5																	
	<i>Eucalyptus racemosa</i>	5																							
	<i>Kunzea capitata</i>	5	5	5	5	5	4	5		5	5	5	4	5	5			5	5	5	5	5	5	5	5
	<i>Leptospermum arachnoides</i>							5		5		5	5												
	<i>Leptospermum squarrosum</i>	5	5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5
<i>Leptospermum trinervium</i>										5														5	
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	4	5	3	5	4	5	5	4	5		5	5	3	5	5		5	4	5	5	5	5	5
	<i>Banksia oblongifolia</i>						5						5												
	<i>Grevillea oleoides</i>										5														
	<i>Hakea dactyloides</i>	5			5				5		5														
	<i>Hakea gibbosa</i>	5		4														5					5		
	<i>Hakea teretifolia</i>	4	5		5		4		4	5	5		5	5	5	5			5	5	5			5	
	<i>Isopogon anethifolius</i>	5	4	5	5																5	5		5	5
	<i>Lambertia formosa</i>											5							5						
	<i>Petrophile pulchella</i>	5	5	4	3	5	4		5	5	5	5	4	5	5	3	5	5	5	5			5	5	
Restionaceae	<i>Baloskion gracile</i>	5																							
	<i>Chordifex dimorphus</i>	4	4	4	4		5				4										5				
	<i>Chordifex fastigiatus</i>		5	5	5	5	5	4	4	4	5	5	5	5	5		5	4	5	5	5	5	5		
	<i>Empodisma minus</i>															5	5								
	<i>Lepyrodia scariosa</i>		5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Rhamnaceae	<i>Cryptandra ericoides</i>											5													
Stylidiaceae	<i>Stylidium lineare</i>								5	5	5		5					5							

Valley Side Swamp monitoring sites – Spring 2019

Swamp 18 – Vegetation condition

		Transect 1									Transect 2									Transect 3					
Family	Species	S18T1Q1S19	S18T1Q2S19	S18T1Q3S19	S18T1Q4S19	S18T1Q5S19	S18T1Q6S19	S18T1Q7S19	S18T1Q8S19	S18T1Q9S19	S18T2Q1S19	S18T2Q2S19	S18T2Q3S19	S18T2Q4S19	S18T2Q5S19	S18T2Q6S19	S18T2Q7S19	S18T2Q8S19	S18T2Q9S19	S18T2Q10S19	S18T3Q1S19	S18T3Q2S19	S18T3Q3S19	S18T3Q4S19	S18T3Q5S19
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	4	5			5				5	5	5				5	4	5		4	5			5	
Total		20	15	17	15	14	20	17	15	19	25	15	24	18	14	14	16	15	14	20	15	16	17	19	12

Condition Scale

- 1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 V: Taxon not presently Endangered, but at risk over a longer period
 a: 1000 plants or more are known to occur within a conservation reserve(s)
 i: less than 1000 plants are known to occur within a conservation reserve(s)

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Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation condition

Family	Species	Transect 1						Transect 2					Transect 3			
		S24T1Q1S19	S24T1Q2S19	S24T1Q3S19	S24T1Q4S19	S24T1Q5S19	S24T1Q6S19	S24T2Q1S19	S24T2Q2S19	S24T2Q3S19	S24T2Q4S19	S24T2Q5S19	S24T3Q1S19	S24T3Q2S19	S24T3Q3S19	S24T3Q4S19
Anthericaceae	<i>Thysanotus juncifolius</i>			5												
Apiaceae	<i>Actinotus minor</i>	5	5	5		5		5			5		5			5
	<i>Xanthosia tridentata</i>															5
Casuarinaceae	<i>Allocasuarina</i> spp.										5					
Cunoniaceae	<i>Bauera microphylla</i>			5	5	5			5	5						
	<i>Bauera rubioides</i>				5		5				5					
Cyperaceae	<i>Lepidosperma filiforme</i>			5		5			5	4	5	5	5	5	5	5
	<i>Lepidosperma neesii</i>	5	5									5				5
	<i>Ptilothrix deusta</i>	5	5	5	5		5	5	5	5	5	5		5		5
	<i>Schoenus brevifolius</i>	5	5	5	5	5	5				5	5				
	<i>Schoenus ericetorum</i>															5
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	5	5					5								
Droseraceae	<i>Drosera peltata</i>	5		5										5	5	
Elaeocarpaceae	<i>Tetradlea neglecta</i> ▲3RC-															5
Ericaceae	<i>Epacris microphylla</i>	5	5	5	5	5		5	5				5		5	4
	<i>Epacris obtusifolia</i>	5	5	5	4	5	4	5	5	5		5				
	<i>Leucopogon esquamatus</i>	5	5										5			3
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>							5					5	5	5	5
	<i>Sprengelia incarnata</i>					5				5	5	5				
Fabaceae (Faboideae)	<i>Gompholobium glabratum</i>	5	5					5								
	<i>Mirbelia rubiifolia</i>			5	5			5	5	5		5				
	<i>Pultenaea tuberculata</i>	5						5								
Fabaceae (Mimosoideae)	<i>Acacia linearifolia</i>															5
	<i>Acacia suaveolens</i>															5
Goodeniaceae	<i>Dampiera stricta</i>	5	5	5	5	5	5	5		5						5
Lauraceae	<i>Cassytha glabella</i>	5	5				4		5	5						
Lindsaeaceae	<i>Lindsaea linearis</i>	5			5		5									

Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation condition

Family	Species	Transect 1						Transect 2					Transect 3			
		S24T1Q1S19	S24T1Q2S19	S24T1Q3S19	S24T1Q4S19	S24T1Q5S19	S24T1Q6S19	S24T2Q1S19	S24T2Q2S19	S24T2Q3S19	S24T2Q4S19	S24T2Q5S19	S24T3Q1S19	S24T3Q2S19	S24T3Q3S19	S24T3Q4S19
Lomandraceae	<i>Lomandra cylindrica</i>									5						5
	<i>Lomandra glauca</i>															5
	<i>Lomandra obliqua</i>		5										5			5
Myrtaceae	<i>Baeckea imbricata</i>		5	5	5	5	5			5	5	5		5	5	
	<i>Corymbia gummifera</i>							5					5			5
	<i>Darwinia diminuta</i> ▲2RCi														5	
	<i>Eucalyptus oblonga</i>															5
	<i>Kunzea capitata</i>	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	<i>Leptospermum arachnoides</i>			5						5				5	5	
	<i>Leptospermum polygalifolium</i>			5			5									
	<i>Leptospermum squarrosus</i>	5	5	5	5	5	5	5	5	5	5	5		5	5	5
	<i>Leptospermum trinervium</i>							5					5			
	<i>Entolasia stricta</i>	5			5											3
	<i>Tetrarrhena turfosa</i>					5				5						
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3
	<i>Banksia oblongifolia</i>			5		5			5	5						
	<i>Grevillea oleoides</i>														5	5
	<i>Hakea teretifolia</i>	5	5	5	4	4	3	5	5	4	5		5			
	<i>Isopogon anemonifolius</i>		5				5									
	<i>Lambertia formosa</i>							5								
	<i>Petrophile pulchella</i>							5		5	5			5		
	<i>Symphionema paludosum</i>									5						
Restionaceae	<i>Baloskion gracile</i>	5	4	5	5	5			5				5			
	<i>Chordifex dimorphus</i>							5								
	<i>Chordifex fastigiatus</i>				5	5	3		5	4	5	5	5	5		
	<i>Empodisma minus</i>		5	5	4	5	4	5	5	4	5					
	<i>Leptocarpus tenax</i>	5	5	5	5	5	4		5	5	5	5	5			

Valley Side Swamp monitoring sites – Spring 2019

Swamp 24 – Vegetation condition

Family	Species	Transect 1						Transect 2					Transect 3			
		S24T1Q1S19	S24T1Q2S19	S24T1Q3S19	S24T1Q4S19	S24T1Q5S19	S24T1Q6S19	S24T2Q1S19	S24T2Q2S19	S24T2Q3S19	S24T2Q4S19	S24T2Q5S19	S24T3Q1S19	S24T3Q2S19	S24T3Q3S19	S24T3Q4S19
	<i>Lepyrodia scariosa</i>	5		5		5	5	5	5	5	5	5	5	5	5	5
Stylidiaceae	<i>Stylidium lineare</i>	5	5	5	5	5		5	5	5	5	5	5	5	5	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>		5			5	5		5	5	5		5			5
Xyridaceae	<i>Xyris gracilis</i>			5				5	5							
Total		23	23	25	20	22	19	23	20	25	19	15	17	13	13	25

Condition Scale

1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ RoTAP species

2: Geographic range in Australia less than 100 km
 3: Geographic range in Australia more than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 i: less than 1000 plants are known to occur within a conservation reserve(s)
 -: reserved population size is not accurately known

Valley Side Swamp monitoring sites – Spring 2019

Swamp 25 – Vegetation condition

Family	Species	Transect 1								Transect 2				Transect 3				
		S25T1Q1S19	S25T1Q2S19	S25T1Q3S19	S25T1Q4S19	S25T1Q5S19	S25T1Q6S19	S25T1Q7S19	S25T1Q8S19	S25T2Q1S19	S25T2Q2S19	S25T2Q3S19	S25T2Q4S19	S25T3Q1S19	S25T3Q2S19	S25T3Q3S19	S25T3Q4S19	S25T3Q5S19
Apiaceae	<i>Actinotus minor</i>		4								5							
Casuarinaceae	<i>Allocasuarina distyla</i>				5				5	5								
Colchicaceae	<i>Burchardia umbellata</i>			5														
Cunoniaceae	<i>Bauera microphylla</i>	5	5	5	3					5		5	5					
Cyperaceae	<i>Cyathochaeta diandra</i>	5	5							5	5		5	5				
	<i>Lepidosperma filiiforme</i>				5	5	5					5						
	<i>Lepidosperma neesii</i>			5								5	5	5	5	5	5	5
	<i>Ptilothrix deusta</i>	5	5	5			5	5	5	5	5	5	5	5		5	5	
	<i>Schoenus brevifolius</i>			5	4	4	4	5	5		5	5	4				5	4
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	5								5	5			5				
Ericaceae	<i>Epacris microphylla</i>	5	5							5			5					
	<i>Epacris obtusifolia</i>	5	5		5	5		5	5			5	5					
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>		5								5		5					5
	<i>Gompholobium glabratum</i>										5							
	<i>Mirbelia rubiifolia</i>	5																
	++ <i>Pultenaea aristata</i> ▲2V											5	5					
Goodeniaceae	<i>Dampiera stricta</i>	5			5			5		5	5	5	5				5	5
Lauraceae	<i>Cassytha glabella</i>		5				5	5				5	5					
Myrtaceae	<i>Baeckea imbricata</i>					5	5	5	5		5	5	5					5
	<i>Corymbia gummiifera</i>	5																
	<i>Eucalyptus luehmanniana</i> ▲2RCa	5	5							5								
	<i>Eucalyptus racemosa</i>													5				
	<i>Kunzea capitata</i>		5								5	5	5					
	<i>Leptospermum arachnoides</i>					2					5							
	<i>Leptospermum squarrosum</i>	5	5	5	5	5	5	5	5	5		5	5		5	5	5	5
Poaceae	<i>Entolasia stricta</i>	5									4			5	5	3		
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5

Valley Side Swamp monitoring sites – Spring 2019

Swamp 25 – Vegetation condition

Family	Species	Transect 1								Transect 2				Transect 3				
		S25T1Q1S19	S25T1Q2S19	S25T1Q3S19	S25T1Q4S19	S25T1Q5S19	S25T1Q6S19	S25T1Q7S19	S25T1Q8S19	S25T2Q1S19	S25T2Q2S19	S25T2Q3S19	S25T2Q4S19	S25T3Q1S19	S25T3Q2S19	S25T3Q3S19	S25T3Q4S19	S25T3Q5S19
	<i>Hakea teretifolia</i>	5	5	5	5	5	5	5	5	5		5	5	5		5	5	5
	<i>Persoonia pinifolia</i>	5								5			5	5				
	<i>Petrophile pulchella</i>	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5
	<i>Symphionema paludosum</i>					5												
Restionaceae	<i>Baloskion gracile</i>									4	5							
	<i>Chordifex dimorphus</i>		5										5					
	<i>Chordifex fastigiatus</i>						4	5			5	5	5					
	<i>Empodisma minus</i>	5	5	5	5					5				5			4	5
	<i>Leptocarpus tenax</i>	5	5	5		5		5	5	5	4	5	5	5				
	<i>Lepyrodia scariosa</i>				5	5	5	5	5	5	5	4	4	5				5
Stylidiaceae	<i>Stylidium lineare</i>		5	5								5	5					
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>		5	5				5		5	5	5	5	5	5	5		
Total		18	19	13	12	12	11	13	11	18	18	20	24	14	6	8	9	11

Condition Scale

1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ RoTAP species

2: Geographic range in Australia less than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 V: Taxon not presently Endangered, but at risk over a longer period
 a: 1000 plants or more are known to occur within a conservation reserve(s)

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation condition

Family	Species	Transect 1										Transect 2										Transect 3									
		S101T1Q1S19	S101T1Q2S19	S101T1Q3S19	S101T1Q4S19	S101T1Q5S19	S101T1Q6S19	S101T1Q7S19	S101T1Q8S19	S101T1Q9S19	S101T1Q10S19	S101T2Q1S19	S101T2Q2S19	S101T2Q3S19	S101T2Q4S19	S101T2Q5S19	S101T2Q6S19	S101T2Q7S19	S101T2Q8S19	S101T2Q9S19	S101T3Q1S19	S101T3Q2S19	S101T3Q3S19	S101T3Q4S19	S101T3Q5S19	S101T3Q6S19	S101T3Q7S19	S101T3Q8S19	S101T3Q9S19	S101T3Q10S19	S101T3Q11S19
Anthericaceae	<i>Thysanotus juncifolius</i>																				5					5					
Apiaceae	<i>Actinotus minor</i>											5	5		5		5				5					5					
Casuarinaceae	<i>Allocasuarina littoralis</i>																			5											
Cunoniaceae	<i>Bauera microphylla</i>									5	5			5	5					5						4	5	5			
	<i>Bauera rubioides</i>	5																													
Cyperaceae	<i>Cyathochaeta diandra</i>	5	5								5	5		5	5	5	4	5	4	5	5										
	<i>Lepidosperma filiforme</i>										5																				
	<i>Lepidosperma neesii</i>	5	5	5	5	5	5	4	5	5	4	5	5	5	5	5	5	5	4	5	4	4	5	5	5	4	4	5	5	4	4
	<i>Ptilothrix deusta</i>	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		5	5	5	5	5		5	5	5	5	5	5
	<i>Schoenus brevifolius</i>		5	5	4	5	5	4	5	4	5	5	5	5		5		5	4	5	5		5	4	5	4	4	5	5	4	5
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	5												5	5				5		5					5					
Ericaceae	<i>Epacris microphylla</i>	5									5						5	5	5	5	5	5									
	<i>Epacris obtusifolia</i>						5		5				5	5	5	5	5		5	5		5	5	5	5	5	5		5	5	
	<i>Leucopogon squamatus</i>										5				5																
Fabaceae (Faboideae)	<i>Mirbelia rubiifolia</i>													5												5		5			5
	++ <i>Pultenaea aristata</i> ▲2V															5	5	5													
Goodeniaceae	<i>Dampiera stricta</i>									5											5	5				5	5				5
Haloragaceae	<i>Gonocarpus tetragynus</i>																		5												
Lauraceae	<i>Cassytha glabella</i>			5						5	5		5	5	5	5	5	5			5		5	5		5					5
Myrtaceae	<i>Baeckea imbricata</i>				5	5	5	5	5	5			5		5					5	5	5		5		5			5	5	5
	<i>Darwinia diminuta</i> ▲2RCi																									5	5				
	<i>Leptospermum arachnoides</i>										5																				
	<i>Leptospermum squarrosum</i>	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Orchidaceae	<i>Cryptostylis subulata</i>																									5					
Poaceae	<i>Anisopogon avenaceus</i>												5						5												
	<i>Entolasia stricta</i>	5											5				5				5										

Valley Side Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation condition

Family	Species	Transect 1										Transect 2										Transect 3									
		S101T1Q1S19	S101T1Q2S19	S101T1Q3S19	S101T1Q4S19	S101T1Q5S19	S101T1Q6S19	S101T1Q7S19	S101T1Q8S19	S101T1Q9S19	S101T1Q10S19	S101T2Q1S19	S101T2Q2S19	S101T2Q3S19	S101T2Q4S19	S101T2Q5S19	S101T2Q6S19	S101T2Q7S19	S101T2Q8S19	S101T2Q9S19	S101T3Q1S19	S101T3Q2S19	S101T3Q3S19	S101T3Q4S19	S101T3Q5S19	S101T3Q6S19	S101T3Q7S19	S101T3Q8S19	S101T3Q9S19	S101T3Q10S19	S101T3Q11S19
	<i>Tetrarrhena turfosa</i>																	5								5					
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	<i>Banksia oblongifolia</i>			5			5											5											5		
	<i>Hakea teretifolia</i>	5	5	5	5	5	5	5	5	5	4	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	<i>Persoonia pinifolia</i>																			5											
	<i>Petrophile pulchella</i>	5	5	5		5				5	5	5	5	5	5	5	5	5		5	5	5	5		5	5	5	5			
	<i>Petrophile sessilis</i>								5																						
Restionaceae	<i>Empodisma minus</i>	5										5	5														5				
	<i>Leptocarpus tenax</i>	5		5	4			5				5	5	5	5	5				5		5		5			5			5	
	<i>Lepyrodia scariosa</i>	5	5	5	4	5	5	5	5	5	5	5	5	5	5		5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
Santalaceae	<i>Leptomeria acida</i>																		5												
Stylidiaceae	<i>Stylidium lineare</i>										5	5	5		5		5		5												5
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>																										5				
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>					5							4							5	5	5	5					5			
Total		14	9	11	9	10	10	9	10	12	16	12	18	14	17	12	13	13	17	16	18	14	11	11	9	18	15	12	9	11	12

Condition Scale

1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ **RoTAP species**

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++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation condition

Family	Species	Transect 1						Transect 2					Transect 3				
		S111aT1Q1S19	S111aT1Q2S19	S111aT1Q3S19	S111aT1Q4S19	S111aT1Q5S19	S111aT1Q6S19	S111aT2Q1S19	S111aT2Q2S19	S111aT2Q3S19	S111aT2Q4S19	S111aT2Q5S19	S111aT3Q1S19	S111aT3Q2S19	S111aT3Q3S19	S111aT3Q4S19	S111aT3Q5S19
Apiaceae	<i>Actinotus minor</i>	5	5	5			5	5					5	5			5
	<i>Platysace linearifolia</i>	4	5				5	5					5				
	<i>Xanthosia pilosa</i>							5									
Casuarinaceae	<i>Allocasuarina littoralis</i>								5								
Colchicaceae	<i>Burchardia umbellata</i>							5								5	
Cunoniaceae	<i>Bauera microphylla</i>				5									5		5	5
Cyperaceae	<i>Cyathochaeta diandra</i>	5	5					5					5	5		5	
	<i>Lepidosperma filiforme</i>		5				5							4	5		5
	<i>Lepidosperma neesii</i>					5	5	5	5	5	5	5	5		5		
	<i>Ptilothrix deusta</i>	5	5	5	5			5	5		5	5	5	5	4		4
	<i>Schoenus brevifolius</i>	4		5			5		5	4	5	4			4	5	5
Dilleniaceae	<i>Hibbertia riparia</i>	5		5									5				
	<i>Hibbertia serpyllifolia</i>							5									
Ericaceae	<i>Epacris microphylla</i>	5	5		5	4	3		5				5	5	4		
	<i>Epacris obtusifolia</i>					5							5	5	4	5	5
	<i>Leucopogon esquamatus</i>			5	5									4			
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	5	5	5													
	<i>Sprengelia incarnata</i>															4	
Fabaceae (Faboideae)	<i>Bossiaea ensata</i>													5			
	<i>Dillwynia floribunda</i>																5
	<i>Gompholobium glabratum</i>	5															
	<i>Mirbelia rubiifolia</i>						5						5		5		
	++ <i>Pultenaea aristata</i> ▲2V			5									5				
Goodeniaceae	<i>Dampiera stricta</i>			5	5									5			
Lauraceae	<i>Cassytha glabella</i>	5	5	5	5			5					5	5	5		5
Lomandraceae	<i>Lomandra obliqua</i>							5									

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation condition

Family	Species	Transect 1						Transect 2					Transect 3				
		S111aT1Q1S19	S111aT1Q2S19	S111aT1Q3S19	S111aT1Q4S19	S111aT1Q5S19	S111aT1Q6S19	S111aT2Q1S19	S111aT2Q2S19	S111aT2Q3S19	S111aT2Q4S19	S111aT2Q5S19	S111aT3Q1S19	S111aT3Q2S19	S111aT3Q3S19	S111aT3Q4S19	S111aT3Q5S19
Myrtaceae	<i>Baeckea imbricata</i>				5	5				5			5	5	5	5	
	<i>Corymbia gummifera</i>							5									
	<i>Darwinia diminuta</i> ▲2RCi		5														
	<i>Eucalyptus haemastoma</i>											5					
	<i>Eucalyptus racemosa</i>							5									
	<i>Eucalyptus sieberi</i>						5						5				
	<i>Leptospermum arachnoides</i>	5	5		5	5								5			
	<i>Leptospermum squarrosum</i>			5	5		5		5	5	5	5	5	5	5	5	5
	<i>Leptospermum trinervium</i>					5							5				
Poaceae	<i>Entolasia stricta</i>						5	5									
	<i>Tetrarrhena turfosa</i>																5
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5	5		5	5	5		5	5	5	5	5	5	5
	<i>Banksia oblongifolia</i>		5	5										5			
	<i>Banksia serrata</i>						5										
	<i>Grevillea oleoides</i>				5									5			
	<i>Hakea gibbosa</i>	5	5	4	4					5			5				
	<i>Hakea teretifolia</i>		5		5	5		5	5	5	5	5		5	5	5	5
	<i>Persoonia levis</i>				5												
	<i>Petrophile pulchella</i>	5	5	4	5	5	4	5	5	5	5	5	5	5	5	4	5
	<i>Petrophile sessilis</i>												5				
Restionaceae	<i>Chordifex dimorphus</i>													5			
	<i>Chordifex fastigiatus</i>		5	5	5	4			5	4	5	4		5		5	5
	<i>Empodisma minus</i>						5	3							5	5	5
	<i>Leptocarpus tenax</i>	4	5	5	5			5						5		5	
	<i>Lepyrodia scariosa</i>	5			5	4	5	5	5	4	5	5	5	5	5		5
Rutaceae	<i>Boronia parviflora</i>															4	

Valley Side Swamp monitoring sites – Spring 2019

Swamp 111a – Vegetation condition

Family	Species	Transect 1						Transect 2					Transect 3				
		S111aT1Q1S19	S111aT1Q2S19	S111aT1Q3S19	S111aT1Q4S19	S111aT1Q5S19	S111aT1Q6S19	S111aT2Q1S19	S111aT2Q2S19	S111aT2Q3S19	S111aT2Q4S19	S111aT2Q5S19	S111aT3Q1S19	S111aT3Q2S19	S111aT3Q3S19	S111aT3Q4S19	S111aT3Q5S19
Santalaceae	<i>Leptomeria acida</i>												5				
Selaginellaceae	<i>Selaginella uliginosa</i>																3
Stylidiaceae	<i>Stylidium lineare</i>															5	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	5	5	5		5	5	5					5				
Total		17	18	17	18	11	16	20	11	9	9	10	22	23	15	16	17

Condition Scale

- 1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 V: Taxon not presently Endangered, but at risk over a longer period
 i: less than 1000 plants are known to occur within a conservation reserve(s)

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation condition

		Transect 1							Transect 2							Transect 3									
Family	Species	S125T1Q1S19	S125T1Q2S19	S125T1Q3S19	S125T1Q4S19	S125T1Q5S19	S125T1Q6S19	S125T1Q7S19	S125T2Q1S19	S125T2Q2S19	S125T2Q3S19	S125T2Q4S19	S125T2Q5S19	S125T2Q6S19	S125T2Q7S19	S125T2Q8S19	S125T3Q1S19	S125T3Q2S19	S125T3Q3S19	S125T3Q4S19	S125T3Q5S19	S125T3Q6S19	S125T3Q7S19	S125T3Q8S19	S125T3Q9S19
Apiaceae	<i>Actinotus minor</i>	5		5	5		5	5			5		5	5	5		5				5	5	5		
	<i>Platysace linearifolia</i>		5																						
	<i>Xanthosia tridentata</i>													5											
Casuarinaceae	<i>Allocasuarina distyla</i>	5													5		5								
	<i>Allocasuarina littoralis</i>								5																
Cunoniaceae	<i>Bauera microphylla</i>				5									5											
Cyperaceae	<i>Chorizandra cymbaria</i>										5									1					
	<i>Cyathochaeta diandra</i>	5	5					5							5	5	5					5	5	5	5
	<i>Gahnia sieberiana</i>										4														
	<i>Lepidosperma filiforme</i>		5	3	5	5	5	5	4	5	5		4	5			5			4			5		
	<i>Lepidosperma neesii</i>	5			5				5	5		5	5	5		5	5	5			5				
	<i>Ptilothrix deusta</i>	5			5	5	5	5				5	5	5	5	5	5	5	5		4	5	5	5	5
	<i>Schoenus brevifolius</i>					5				5	4	5		5				5	4	4	5				
	<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i>				5		5	5																	
Dilleniaceae	<i>Hibbertia riparia</i>							5																	
	<i>Hibbertia serpyllifolia</i>			5												5	5								5
Ericaceae	<i>Epacris microphylla</i>		4	5		5		5					5		5		5	5						5	5
	<i>Epacris obtusifolia</i>						5			5	5			5											
	<i>Leucopogon esquamatus</i>				5			5																	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	5		5			5	5								5									5
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	5	5	5	5	5	5		5	5		5		5				5	5	5	5	5	5	5	5
	<i>Mirbelia rubiifolia</i>							5																	
	<i>Pultenaea tuberculata</i>																								5
Goodeniaceae	<i>Dampiera stricta</i>		5				5	5						5			5				5				5
Haloragaceae	<i>Gonocarpus tetragynus</i>													5	5	5									5
Lauraceae	<i>Cassytha glabella</i>	5	5		4			5				5	5	4		5	5	5		5	5	5		5	5

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation condition

		Transect 1							Transect 2							Transect 3									
Family	Species	S125T1Q1S19	S125T1Q2S19	S125T1Q3S19	S125T1Q4S19	S125T1Q5S19	S125T1Q6S19	S125T1Q7S19	S125T2Q1S19	S125T2Q2S19	S125T2Q3S19	S125T2Q4S19	S125T2Q5S19	S125T2Q6S19	S125T2Q7S19	S125T2Q8S19	S125T3Q1S19	S125T3Q2S19	S125T3Q3S19	S125T3Q4S19	S125T3Q5S19	S125T3Q6S19	S125T3Q7S19	S125T3Q8S19	S125T3Q9S19
Lindsaeaceae	Lindsaea linearis		5	5	5			5					5			5	5					5			
Lomandraceae	Lomandra obliqua	5					5								5										
Myrtaceae	Angophora hispida						5	5																	
	Baeckea imbricata			4	5	5			5	5	5	5		5						5					
	Darwinia diminuta ▲2RCi	5		5	5		5							5	5										
	Darwinia fascicularis	5			5																				
	Eucalyptus racemosa																5							5	5
	Leptospermum arachnoides		5	5	5	5							5			5									
	Leptospermum squarrosum		5	5	5	5			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Leptospermum trinervium	5					5	5																	
Pittosporaceae	Billardiera scandens						5																		
Poaceae	Anisopogon avenaceus						5																		
Proteaceae	Banksia ericifolia subsp. ericifolia	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5
	Banksia marginata						5	5																	
	Banksia oblongifolia				4																				
	Hakea dactyloides														5										
	Hakea gibbosa			4		5	5			5													5	5	
	Hakea teretifolia	5	5	5				5	5	5	5	5			5		5	5	5	5	5	5	5	5	5
	Isopogon anethifolius	5		5	5	4	5	5	4	5	5		5	5	5		5			5	5	4	5		5
	Lomatia silaifolia						5																		
	Persoonia pinifolia						5									5								5	
	Petrophile pulchella	5	5			5	5	5	4		5	5			4	5	4	5		5			4		
Restionaceae	Chordifex dimorphus						3	5							4										
	Chordifex fastigiatus	5	4	5	4	5		5	5	5	5	5	5	5		5						4	4		5
	Empodisma minus								5	5							5	4	4	4	4	5	5		
	Leptocarpus tenax	5	5				5	5								5	5							5	5

Valley Side Swamp monitoring sites – Spring 2019

Swamp 125 – Vegetation condition

		Transect 1							Transect 2							Transect 3									
Family	Species	S125T1Q1S19	S125T1Q2S19	S125T1Q3S19	S125T1Q4S19	S125T1Q5S19	S125T1Q6S19	S125T1Q7S19	S125T2Q1S19	S125T2Q2S19	S125T2Q3S19	S125T2Q4S19	S125T2Q5S19	S125T2Q6S19	S125T2Q7S19	S125T2Q8S19	S125T3Q1S19	S125T3Q2S19	S125T3Q3S19	S125T3Q4S19	S125T3Q5S19	S125T3Q6S19	S125T3Q7S19	S125T3Q8S19	S125T3Q9S19
	<i>Lepyrodia scariosa</i>	5		5		5		5	5	5	5	5	5			5	5	5	5	5		4	5	5	
Stylidiaceae	<i>Stylidium lineare</i>		5	5	5	5	5	5						5											
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>										5		5	3	5	5					5		4		
Total		19	16	18	20	15	24	25	13	14	15	12	14	20	16	17	20	12	8	13	14	12	15	13	18

Condition Scale

1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

▲ RoTAP species

2: Geographic range in Australia less than 100 km
 R: Rare in Australia but does not have an identifiable threat
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 i: less than 1000 plants are known to occur within a conservation reserve(s)

Valley Side Swamp monitoring sites – Spring 2019

Species which recorded an increase in average condition (from autumn 2019)

Longwall and Control Sites	Longwall Sites Only	Control Sites Only
<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	<i>Allocasuarina distyla</i>	<i>Chorizandra cymbaria</i> *
<i>Banksia oblongifolia</i>	<i>Baeckea imbricata</i>	<i>Cyathochaeta diandra</i>
<i>Cassytha glabella</i>	<i>Baloskion gracile</i> *	<i>Dillwynia floribunda</i>
<i>Chordifex fastigiatus</i>	<i>Bauera microphylla</i>	<i>Tetrarrhena turfosa</i>
<i>Empodisma minus</i>	<i>Chordifex dimorphus</i>	<i>Xanthosia pilosa</i>
<i>Epacris microphylla</i>	<i>Dampiera stricta</i>	
<i>Epacris obtusifolia</i>	<i>Hakea dactyloides</i>	
<i>Lepidosperma filiforme</i>	<i>Hakea gibbosa</i>	
<i>Lepidosperma neesii</i>	<i>Hakea teretifolia</i>	
<i>Leptocarpus tenax</i>	<i>Hibbertia serpyllifolia</i>	
<i>Leptospermum squarrosum</i>	<i>Kunzea capitata</i> *	
<i>Lepyrodia scariosa</i>	<i>Lambertia formosa</i> *	
<i>Petrophile pulchella</i>	<i>Leucopogon esquamatus</i>	
<i>Ptilothrix deusta</i>	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	
<i>Schoenus brevifolius</i>	++ <i>Pultenaea aristata</i> ▲2V	
<i>Sprengelia incarnata</i>	<i>Pultenaea stipularis</i> *	
<i>Xanthorrhoea resinosa</i>		

* Species only recorded in either longwall or control sites, spring 2019.

▲ RoTAP species

2: Geographic range in Australia less than 100 km

V: Taxon not presently Endangered, but at risk over a longer period

++ Species listed as Vulnerable under NSW Threatened Species Conservation Act (1995) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Species which recorded a decrease in average condition (from autumn 2019)

Longwall and Control Sites	Longwall Sites Only	Control Sites Only
<i>Baeckea imbricata</i>	<i>Actinotus minor</i>	<i>Hakea gibbosa</i>
<i>Bauera microphylla</i>	<i>Boronia ledifolia</i> *	<i>Persoonia pinifolia</i>
<i>Cassytha glabella</i>	<i>Bossiaea scolopendria</i> *	<i>Schoenus brevifolius</i>
<i>Chordifex dimorphus</i>	<i>Chordifex fastigiatus</i>	<i>Selaginella uliginosa</i> *
<i>Epacris microphylla</i>	<i>Cyathochaeta diandra</i>	
<i>Epacris obtusifolia</i>	<i>Dampiera stricta</i>	
<i>Hakea teretifolia</i>	<i>Dillwynia retorta</i> *	
<i>Isopogon anethifolius</i>	<i>Entolasia stricta</i>	
<i>Lepidosperma filiforme</i>	<i>Eucalyptus oblonga</i> *	
<i>Leptocarpus tenax</i>	<i>Hibbertia riparia</i>	
<i>Leucopogon esquamatus</i>	<i>Leptospermum arachnoides</i>	
<i>Platysace linearifolia</i>	<i>Lepyrodia scariosa</i>	
<i>Xanthorrhoea resinosa</i>	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	
	<i>Lomandra obliqua</i>	
	<i>Mirbelia rubiifolia</i>	
	++ <i>Pultenaea aristata</i> ▲2V	

* Species only recorded in either longwall or control sites, spring 2019.

▲ RoTAP species

2: Geographic range in Australia less than 100 km

V: Taxon not presently Endangered, but at risk over a longer period

++ Species listed as Vulnerable under NSW Threatened Species Conservation Act (1995) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Indicator species data – Valley side swamps

Valley Side Swamp monitoring sites – Spring 2019

Longwall Sites – Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 18	<i>Epacris obtusifolia</i>	I21	309745.35	6214889.00	2	4
Swamp 18	<i>Epacris obtusifolia</i>	I22	309755.21	6214874.11	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I23	309766.02	6214884.75	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I24	309740.20	6214889.32	4	1
Swamp 18	<i>Epacris obtusifolia</i>	I25	309759.57	6214884.61	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I26	309757.69	6214889.79	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I27	309757.66	6214882.81	4	1
Swamp 18	<i>Epacris obtusifolia</i>	I28	309765.46	6214887.55	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I29	309756.95	6214894.27	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I30	309748.31	6214891.85	2	4
Swamp 18	<i>Epacris obtusifolia</i>	I31	309761.38	6214879.94	2	5
Swamp 18	<i>Epacris obtusifolia</i>	I32	309753.47	6214882.74	2	3
Swamp 18	<i>Epacris obtusifolia</i>	I33	309771.60	6214890.14	2	1
Swamp 18	<i>Epacris obtusifolia</i>	I34	309745.61	6214881.52	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I35	309750.72	6214893.67	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I36	309759.24	6214899.28	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I37	309753.92	6214899.90	1	1
Swamp 18	<i>Epacris obtusifolia</i>	I38	309780.01	6214888.92	3	3
Swamp 18	<i>Epacris obtusifolia</i>	I39	309771.92	6214885.49	2	1
Swamp 18	<i>Epacris obtusifolia</i>	I40	309750.30	6214881.37	3	4
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j1	309736.15	6214891.68	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j2	309731.60	6214888.88	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j3	309729.01	6214890.78	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j4	309727.22	6214893.59	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j5	309731.83	6214894.48	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j6	309733.48	6214891.72	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j7	309736.15	6214885.13	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j8	309738.31	6214880.41	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j9	309742.47	6214883.90	5	4
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j10	309735.03	6214899.04	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j11	309740.09	6214900.37	5	4
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j12	309759.91	6214892.80	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j13	309761.85	6214891.58	3	4
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j14	309765.95	6214891.93	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j15	309774.57	6214889.16	4	2
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j16	309772.06	6214880.41	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j17	309767.52	6214878.11	5	2
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j18	309760.01	6214880.59	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j19	309750.96	6214868.38	1	1
Swamp 18	++ <i>Pultenaea aristata</i> ▲2V	j20	309745.53	6214861.77	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I61	311321.01	6214040.33	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I62	311352.64	6214019.14	4	1
Swamp 24	<i>Epacris obtusifolia</i>	I63	311348.84	6214023.33	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I64	311354.23	6214026.69	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I65	311322.06	6214030.18	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I66	311339.31	6214024.32	4	1
Swamp 24	<i>Epacris obtusifolia</i>	I67	311319.10	6214040.40	4	1

Valley Side Swamp monitoring sites – Spring 2019

Longwall Sites – Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 24	<i>Epacris obtusifolia</i>	I68	311307.62	6214046.55	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I69	311334.73	6214026.96	4	1
Swamp 24	<i>Epacris obtusifolia</i>	I70	311324.15	6214033.62	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I71	311314.76	6214044.04	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I72	311331.66	6214013.21	3	1
Swamp 24	<i>Epacris obtusifolia</i>	I73	311325.90	6214018.39	5	1
Swamp 24	<i>Epacris obtusifolia</i>	I74	311328.67	6214028.78	3	1
Swamp 24	<i>Epacris obtusifolia</i>	I75	311321.10	6214035.26	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I76	311358.00	6214018.91	4	1
Swamp 24	<i>Epacris obtusifolia</i>	I77	311343.00	6214028.12	4	1
Swamp 24	<i>Epacris obtusifolia</i>	I78	311344.05	6214012.04	1	1
Swamp 24	<i>Epacris obtusifolia</i>	I79	311347.30	6214017.11	5	1
Swamp 24	<i>Epacris obtusifolia</i>	I80	311346.19	6214026.99	3	1
Swamp 24	<i>Sprengelia incarnata</i>	k41	311342.19	6214021.21	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k42	311342.30	6214024.33	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k43	311342.89	6214023.74	3	1
Swamp 24	<i>Sprengelia incarnata</i>	k44	311338.46	6214023.11	5	1
Swamp 24	<i>Sprengelia incarnata</i>	k45	311341.26	6214027.46	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k46	311334.09	6214028.64	4	4
Swamp 24	<i>Sprengelia incarnata</i>	k47	311331.18	6214031.38	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k48	311330.12	6214035.02	3	2
Swamp 24	<i>Sprengelia incarnata</i>	k49	311328.37	6214036.09	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k50	311327.76	6214029.59	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k51	311325.96	6214026.55	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k52	311320.67	6214027.68	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k53	311317.12	6214026.46	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k54	311317.08	6214030.60	4	1
Swamp 24	<i>Sprengelia incarnata</i>	k55	311318.48	6214033.61	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k56	311322.46	6214037.38	4	1
Swamp 24	<i>Sprengelia incarnata</i>	k57	311322.75	6214034.57	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k58	311323.85	6214030.70	1	1
Swamp 24	<i>Sprengelia incarnata</i>	k59	311326.40	6214029.80	5	1
Swamp 24	<i>Sprengelia incarnata</i>	k60	311329.54	6214032.29	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J81	311317.85	6214014.35	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J82	311320.95	6214011.73	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J83	311320.95	6214009.69	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J84	311323.18	6214012.95	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J85	311323.21	6214010.20	3	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J86	311322.08	6214009.51	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J87	311323.78	6214011.69	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J88	311325.90	6214013.48	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J89	311325.13	6214010.41	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J90	311326.05	6214011.15	5	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J91	311325.40	6214009.35	3	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J92	311328.50	6214009.04	4	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J93	311329.26	6214007.20	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J94	311329.77	6214006.70	1	1

Valley Side Swamp monitoring sites – Spring 2019

Longwall Sites – Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J95	311331.93	6214004.00	4	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J96	311329.17	6214005.20	1	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J97	311325.15	6214006.78	3	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J98	311323.98	6214006.66	4	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J99	311324.29	6214006.20	4	1
Swamp 24	++ <i>Pultenaea aristata</i> ▲ 2V	J100	311325.05	6214005.96	2	1
Swamp 25	<i>Epacris obtusifolia</i>	I81	311161.21	6214008.39	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I82	311163.86	6214007.40	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I83	311165.89	6214005.05	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I84	311176.38	6214011.42	5	4
Swamp 25	<i>Epacris obtusifolia</i>	I85	311183.08	6214008.28	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I86	311185.64	6214015.17	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I87	311181.28	6214025.18	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I88	311174.79	6214030.71	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I89	311167.55	6214034.75	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I90	311170.04	6214038.65	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I91	311160.10	6214043.29	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I92	311144.17	6214074.19	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I93	311138.06	6214083.13	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I94	311130.50	6214090.37	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I95	311128.61	6214100.60	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I96	311135.19	6214105.65	3	4
Swamp 25	<i>Epacris obtusifolia</i>	I97	311132.84	6214118.08	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I98	311131.90	6214123.28	3	4
Swamp 25	<i>Epacris obtusifolia</i>	I99	311124.65	6214122.73	1	1
Swamp 25	<i>Epacris obtusifolia</i>	I100	311122.50	6214124.94	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j41	311153.20	6214052.66	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j42	311144.83	6214062.96	4	2
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j43	311146.83	6214069.98	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j44	311132.83	6214085.49	4	5
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j45	311142.36	6214076.40	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j46	311153.77	6214054.84	3	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j47	311139.58	6214072.32	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j48	311145.30	6214065.07	3	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j49	311150.07	6214056.66	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j50	311129.26	6214095.85	5	3
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j51	311146.68	6214072.87	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j52	311148.60	6214059.91	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j53	311134.84	6214082.75	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j54	311153.12	6214050.94	5	4
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j55	311122.10	6214097.21	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j56	311143.58	6214073.80	1	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j57	311125.18	6214103.18	4	5
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j58	311140.71	6214077.98	4	1
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j59	311137.87	6214080.64	5	5
Swamp 25	++ <i>Pultenaea aristata</i> ▲ 2V	j60	311126.77	6214099.19	1	1

NB: Shaded rows indicate dead individuals

Condition Scale

- 1 = severe damage/dieback
- 2 = many dead stems
- 3 = some dead branches
- 4 = minor damage
- 5 = healthy

Reproductive Status:

- 1 = nil
- 2 = sparse (occasional flowers only)
- 3 = low (under 25 percent of potential)
- 4 = moderate (25 to 75 percent of potential)
- 5 = high (over 75 percent of potential flowering)

▲ RoTAP species

2: Geographic range in Australia less than 100 km

V: Taxon not presently Endangered, but at risk over a longer period

++ Species listed as Vulnerable under NSW Biodiversity Conservation Act (2016) and Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Valley Side Swamp monitoring sites – Spring 2019

Control Sites – Condition and reproductive status for swamp indicator species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 101	<i>Epacris obtusifolia</i>	l41	308696.94	6216573.06	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l42	308698.29	6216572.77	4	4
Swamp 101	<i>Epacris obtusifolia</i>	l43	308699.65	6216575.72	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l44	308703.22	6216570.71	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l45	308706.29	6216567.89	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l46	308710.24	6216572.26	4	4
Swamp 101	<i>Epacris obtusifolia</i>	l47	308714.22	6216577.04	3	1
Swamp 101	<i>Epacris obtusifolia</i>	l48	308720.99	6216580.27	3	4
Swamp 101	<i>Epacris obtusifolia</i>	l49	308732	6216587.19	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l50	308735.89	6216589.07	4	3
Swamp 101	<i>Epacris obtusifolia</i>	l51	308739.86	6216595.96	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l52	308772.54	6216611.41	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l53	308775.64	6216619.19	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l54	308771.78	6216626.48	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l55	308781.96	6216625.59	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l56	308788.75	6216627.48	1	1
Swamp 101	<i>Epacris obtusifolia</i>	l57	308777.29	6216633.46	3	3
Swamp 101	<i>Epacris obtusifolia</i>	l58	308727.68	6216613.98	5	2
Swamp 101	<i>Epacris obtusifolia</i>	l59	308720.75	6216619.83	3	3
Swamp 101	<i>Epacris obtusifolia</i>	l60	308719.39	6216626.02	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j21	308832.7	6216613.16	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j22	308834.07	6216633.1	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j23	308831.72	6216629.96	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j24	308840.62	6216615.02	4	4
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j25	308773.28	6216625.16	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j26	308847.39	6216623.03	2	2
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j27	308836.48	6216637.63	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j28	308786.6	6216631.24	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j29	308847.25	6216615.33	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j30	308846.08	6216628.88	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j31	308822.35	6216606.11	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j32	308845.52	6216619.22	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j33	308814.53	6216599.17	2	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j34	308843.93	6216634.7	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j35	308826.15	6216609.29	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j36	308799.6	6216629.66	5	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j37	308843.86	6216631.98	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j38	308801.91	6216634.58	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j39	308797.82	6216631.93	1	1
Swamp 101	++ <i>Pultenaea aristata</i> ▲ 2V	j40	308770.53	6216620.87	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k21	308700.41	6216577.94	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k22	308703.65	6216570.92	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k23	308705.98	6216573.59	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k24	308697.24	6216572.99	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k25	308701.31	6216571.4	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k26	308700.59	6216571.96	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k27	308701.09	6216576.7	2	4

Valley Side Swamp monitoring sites – Spring 2019

Control Sites – Condition and reproductive status for swamp indicator species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 101	<i>Sprengelia incarnata</i>	k28	308707.17	6216569.08	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k29	308702.97	6216572.37	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k30	308693.67	6216576.57	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k31	308715.79	6216581.56	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k32	308708.71	6216565.97	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k33	308708.48	6216568.81	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k34	308707.62	6216569.96	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k35	308707.12	6216573.38	3	4
Swamp 101	<i>Sprengelia incarnata</i>	k36	308706.15	6216574.23	4	4
Swamp 101	<i>Sprengelia incarnata</i>	k37	308704.25	6216575.22	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k38	308703.14	6216577.72	3	3
Swamp 101	<i>Sprengelia incarnata</i>	k39	308704.35	6216577.59	1	1
Swamp 101	<i>Sprengelia incarnata</i>	k40	308702.33	6216578.12	3	3
Swamp 111a	<i>Epacris obtusifolia</i>	l101	308879.03	6217102.41	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l102	308884.33	6217099.34	3	1
Swamp 111a	<i>Epacris obtusifolia</i>	l103	308885.64	6217102.97	3	1
Swamp 111a	<i>Epacris obtusifolia</i>	l104	308889	6217095.55	4	1
Swamp 111a	<i>Epacris obtusifolia</i>	l105	308883.4	6217092.17	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l106	308880.87	6217085.68	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l107	308873.96	6217083.2	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l108	308876.43	6217073.33	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l109	308881.63	6217062.49	4	3
Swamp 111a	<i>Epacris obtusifolia</i>	l110	308883.68	6217056.98	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l111	308881.73	6217052	2	2
Swamp 111a	<i>Epacris obtusifolia</i>	l112	308870.83	6217049.36	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l113	308881.9	6217044.02	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l114	308882.18	6217040.11	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l115	308876.55	6217027.23	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l116	308865.24	6217021.44	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l117	308865.58	6217003.63	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l118	308873.01	6217003.43	4	2
Swamp 111a	<i>Epacris obtusifolia</i>	l119	308871.37	6216996.23	1	1
Swamp 111a	<i>Epacris obtusifolia</i>	l120	308866.31	6216985.2	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j61	308882.29	6217106.78	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j62	308885.23	6217110.52	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j63	308874.69	6217092.26	2	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j64	308874.07	6217086.92	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j65	308857.29	6216994.64	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j66	308859.13	6216988.2	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j67	308883.17	6217077.08	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j68	308887.61	6217090.67	2	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j69	308882.01	6217102.81	2	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j70	308877.67	6217099.07	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j71	308883.45	6217070.03	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j72	308870.7	6217018.82	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j73	308889.33	6217103.26	3	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j74	308866.44	6217011.86	1	1

Valley Side Swamp monitoring sites – Spring 2019

Control Sites – Condition and reproductive status for swamp indicator species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j75	308864.11	6217006.18	2	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j76	308883.14	6217114.36	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j77	308858.89	6216981.25	1	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j78	308890.24	6217115.29	2	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j79	308856.76	6217001.14	3	1
Swamp 111a	++ <i>Pultenaea aristata</i> ▲ 2V	j80	308871.34	6217052.52	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l1	309717.56	6218871.68	4	1
Swamp 125	<i>Epacris obtusifolia</i>	l2	309699.12	6218867.19	2	1
Swamp 125	<i>Epacris obtusifolia</i>	l3	309695.68	6218858.68	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l4	309719.64	6218868.25	3	1
Swamp 125	<i>Epacris obtusifolia</i>	l5	309704.76	6218877.7	5	1
Swamp 125	<i>Epacris obtusifolia</i>	l6	309714.38	6218871.99	4	1
Swamp 125	<i>Epacris obtusifolia</i>	l7	309701.58	6218870.57	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l8	309696.02	6218860.99	3	1
Swamp 125	<i>Epacris obtusifolia</i>	l9	309701.63	6218865.22	2	1
Swamp 125	<i>Epacris obtusifolia</i>	l10	309704.28	6218860.33	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l11	309697.54	6218855.47	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l12	309708.63	6218861.34	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l13	309694.21	6218852.71	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l14	309719.81	6218859.24	2	1
Swamp 125	<i>Epacris obtusifolia</i>	l15	309722.54	6218857.19	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l16	309702.71	6218857.51	2	1
Swamp 125	<i>Epacris obtusifolia</i>	l17	309698.59	6218839.05	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l18	309698.98	6218864.21	1	1
Swamp 125	<i>Epacris obtusifolia</i>	l19	309710.72	6218872.64	2	1
Swamp 125	<i>Epacris obtusifolia</i>	l20	309728.52	6218860.19	3	1
Swamp 125	<i>Sprengelia incarnata</i>	k1	309696.01	6218850.47	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k2	309688.13	6218853.83	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k3	309711.09	6218865.83	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k4	309699.11	6218852.97	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k5	309695.77	6218854.6	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k6	309692.79	6218852.81	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k7	309698.88	6218841.35	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k8	309698.11	6218855.27	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k9	309710.98	6218867.15	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k10	309707.83	6218868.02	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k11	309691.02	6218855.1	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k12	309702.97	6218856.42	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k13	309690.97	6218854.15	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k14	309696.42	6218847.88	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k15	309695.72	6218843.07	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k16	309703.93	6218856.28	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k17	309695.97	6218851.16	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k18	309693.33	6218847.63	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k19	309709.69	6218868.81	1	1
Swamp 125	<i>Sprengelia incarnata</i>	k20	309704.1	6218861.7	2	2

NB: Shaded rows indicate dead individuals

Condition Scale

- 1 = severe damage/dieback
- 2 = many dead stems
- 3 = some dead branches
- 4 = minor damage
- 5 = healthy

Reproductive Status:

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- 2 = sparse (occasional flowers only)
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- 5 = high (over 75 percent of potential flowering)

▲ RoTAP species

2: Geographic range in Australia less than 100 km

V: Taxon not presently Endangered, but at risk over a longer period

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Appendix F : Vegetation monitoring raw data – Tea tree thicket swamp monitoring sites

Vegetation structure, dominant species and estimated cover for each stratum – Tea tree thicket swamps

Tea Tree Thicket monitoring sites – Spring 2019

Swamp 20 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
S20T1Q1S19	M1	1	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea dactyloides</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.1	5	<i>Xanthorrhoea resinosa</i> , <i>Empodisma minus</i> , <i>Lepidosperma neesii</i>
S20T1Q2S19	M1	1.5	4.5	40	<i>Bauera rubioides</i> , <i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Xanthorrhoea resinosa</i> , <i>Empodisma minus</i>
S20T1Q3S19	M1	2.5	4	15	<i>Hakea teretifolia</i> , <i>Banksia robur</i>
	L1	0	2.2	10	<i>Bauera rubioides</i> , <i>Gleichenia dicarpa</i>
S20T1Q4S19	M1	0.8	1.8	20	<i>Banksia robur</i> , <i>Eucalyptus piperita</i>
	L1	0	1	5	<i>Empodisma minus</i> , <i>Gleichenia dicarpa</i>
S20T1Q5S19	M1	0.3	1.8	10	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Baeckea linifolia</i>
	L1	0	0.3	1	<i>Baumea</i> spp., <i>Empodisma minus</i>
S20T1Q6S19	M1	1.5	3	40	<i>Hakea teretifolia</i> , <i>Baeckea linifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	50	<i>Bauera rubioides</i> , <i>Empodisma minus</i> , <i>Lepyrodia scariosa</i>
S20T1Q7S19	M1	1.5	4	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	2	5	<i>Bauera rubioides</i> , <i>Empodisma minus</i>
Transect 2					
S20T2Q1S19	M1	1	4	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Bauera rubioides</i>
	L1	0	2	1	<i>Empodisma minus</i> , <i>Bauera microphylla</i>
S20T2Q2S19	M1	3	4.5	10	<i>Hakea teretifolia</i>
	L1	1.5	3.5	60	<i>Bauera rubioides</i>
S20T2Q3S19	M1	2.5	3.5	10	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Banksia robur</i>
	L1	0	2.5	20	<i>Bauera rubioides</i>
S20T2Q4S19	M1	1	3.5	80	<i>Bauera rubioides</i> , <i>Leptospermum juniperinum</i> , <i>Banksia robur</i>
	L1	0	1.2	1	<i>Gleichenia microphylla</i> , <i>Empodisma minus</i>
S20T2Q5S19	M1	2.5	4.5	40	<i>Hakea teretifolia</i> , <i>Banksia robur</i>
	L1	0	2.5	30	<i>Bauera rubioides</i> , <i>Gleichenia microphylla</i>
S20T2Q6S19	M1	1.3	5	80	<i>Bauera rubioides</i> , <i>Baeckea linifolia</i> , <i>Banksia robur</i>
	L1	0	1.8	10	<i>Gleichenia microphylla</i> , <i>Empodisma minus</i>
S20T2Q7S19	M1	2	6	90	<i>Bauera rubioides</i> , <i>Baeckea linifolia</i> , <i>Banksia robur</i>
	L1	0	1.8	1	<i>Gleichenia microphylla</i>

Tea Tree Thicket monitoring sites – Spring 2019

Swamp 20 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S20T2Q8S19	M1	0.5	4	60	<i>Bauera rubioides</i> , <i>Banksia robur</i>
	L1	0	1.2	35	<i>Gleichenia microphylla</i> , <i>Gahnia sieberiana</i>
S20T2Q9S19	M1	2	7	50	<i>Melaleuca squarrosa</i> , <i>Banksia robur</i> , <i>Leptospermum squarrosum</i>
	L1	0	2.5	80	<i>Bauera rubioides</i> , <i>Gahnia sieberiana</i> , <i>Gleichenia microphylla</i>
S20T2Q10S19	M1	2	3	5	<i>Hakea teretifolia</i>
	L1	0	1.5	95	<i>Bauera rubioides</i> , <i>Gleichenia microphylla</i>
S20T2Q11S19	M1	0.7	6	40	<i>Banksia robur</i>
	L1	0	1.2	40	<i>Gleichenia microphylla</i>
S20T2Q12S19	M1	2.2	3.5	5	<i>Banksia robur</i> , <i>Leptospermum juniperinum</i>
	L1	0	1.5	85	<i>Gleichenia microphylla</i> , <i>Bauera rubioides</i>
S20T2Q13S19	M1	1.2	5.5	20	<i>Bauera rubioides</i>
	L1	0	1.3	50	<i>Gleichenia microphylla</i> , <i>Gahnia sieberiana</i>
S20T2Q14S19	M1	2	4	10	<i>Banksia robur</i>
	L1	0	1.3	50	<i>Gleichenia microphylla</i>
Transect 3					
S20T3Q1S19	M1	1	5	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Melaleuca squarrosa</i> , <i>Bauera rubioides</i>
	L1	0	1	1	<i>Gahnia sieberiana</i> , <i>Bauera rubioides</i>
S20T3Q2S19	M1	1	4	80	<i>Bauera rubioides</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Melaleuca squarrosa</i>
S20T3Q3S19	M1	2	3.5	60	<i>Bauera rubioides</i>
	L1	0	0.5	1	<i>Gleichenia microphylla</i>
S20T3Q4S19	M1	1.5	3	70	<i>Bauera rubioides</i> , <i>Banksia robur</i> , <i>Gleichenia microphylla</i>
	L1	0	0.7	1	<i>Gleichenia microphylla</i>
S20T3Q5S19	M1	1.4	6	40	<i>Banksia robur</i> , <i>Acacia longifolia</i> subsp. <i>longifolia</i> , <i>Leptospermum juniperinum</i>
	L1	0	2	80	<i>Gahnia sieberiana</i> , <i>Gleichenia microphylla</i> , <i>Bauera rubioides</i>
S20T3Q6S19	M1	1.2	2.7	80	<i>Gahnia sieberiana</i> , <i>Banksia robur</i> , <i>Bauera rubioides</i>
	L1	0	2	1	<i>Gleichenia microphylla</i>
S20T3Q7S19	M1	1.2	4	50	<i>Leptospermum juniperinum</i> , <i>Banksia robur</i>
	L1	0	1.6	70	<i>Gleichenia microphylla</i> , <i>Gahnia sieberiana</i> , <i>Bauera rubioides</i>
S20T3Q8S19	M1	1	4.2	90	<i>Bauera rubioides</i> , <i>Banksia robur</i>
S20T3Q9S19	M1	3	4.5	5	<i>Leptospermum juniperinum</i>

Tea Tree Thicket monitoring sites – Spring 2019

Swamp 20 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
	L1	0	2.2	95	<i>Bauera rubioides</i> , <i>Gleichenia microphylla</i>
S20T3Q10S19	M1	1.2	5	80	<i>Bauera rubioides</i> , <i>Banksia robur</i> , <i>Leptospermum juniperinum</i>
	L1	0	1.3	20	<i>Gleichenia microphylla</i> , <i>Empodisma minus</i> , <i>Cyathochaeta diandra</i>
S20T3Q11S19	M1	0.3	0.5	5	<i>Bauera rubioides</i>
	L1	0	0.4	5	<i>Gleichenia microphylla</i>
S20T3Q12S19	M1	1	5	60	<i>Acacia longifolia</i> subsp. <i>longifolia</i> , <i>Leptospermum juniperinum</i> , <i>Banksia robur</i>
	L1	0	1.1	70	<i>Bauera rubioides</i> , <i>Gleichenia microphylla</i>
S20T3Q13S19	M1	1.2	5	60	<i>Bauera rubioides</i> , <i>Leptospermum juniperinum</i>
	L1	0	1.3	50	<i>Gleichenia microphylla</i>

Legend

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

Tea Tree Thicket monitoring sites – Spring 2019

Woronora River 1 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
WORT1Q1S19	T	8	10	40	<i>Eucalyptus racemosa</i>
	M1	0.8	4	30	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Dillwynia floribunda</i>
	L1	0	1.1	60	<i>Gleichenia microphylla</i> , <i>Lepidosperma limicola</i> , <i>Lepidosperma quadrangulatum</i>
WORT1Q2S19	M1	0.5	3.5	25	<i>Melaleuca squarrosa</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	25	<i>Gleichenia microphylla</i> , <i>Lepidosperma quadrangulatum</i> , <i>Lepidosperma limicola</i>
WORT1Q3S19	M1	2	3	1	<i>Banksia robur</i>
	L1	0	0.3	1	<i>Empodisma minus</i> , <i>Gleichenia microphylla</i>
WORT1Q4S19	M1	0.1	2.5	1	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum juniperinum</i>
	L1	0	1.1	5	<i>Lepidosperma quadrangulatum</i> , <i>Gleichenia microphylla</i>
WORT1Q5S19	M1	0.6	4	35	<i>Persoonia pinifolia</i>
	L1	0	0.5	5	<i>Gleichenia microphylla</i>
WORT1Q6S19	T	10	12	25	<i>Eucalyptus sieberi</i>
	M1	1.8	5	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Persoonia pinifolia</i> , <i>Bauera rubioides</i>
	L1	0	2.2	5	<i>Lepidosperma quadrangulatum</i>

Legend

T: Upper storey

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

Tea Tree Thicket monitoring sites – Spring 2019

Woronora River South Arm – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
WORSTHT1Q1S19	M1	1	3.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Banksia oblongifolia</i> , <i>Leptospermum grandifolium</i>
	L1	0	1.5	50	<i>Gleichenia microphylla</i> , <i>Lepidosperma limicola</i> , <i>Chorizandra cymbaria</i>
WORSTHT1Q2S19	M1	1.5	3	20	<i>Banksia robur</i> , <i>Hakea teretifolia</i> , <i>Leptospermum grandifolium</i>
	L1	0	1.6	5	<i>Gleichenia microphylla</i> , <i>Lepidosperma limicola</i> , <i>Chorizandra cymbaria</i>
WORSTHT1Q3S19	M1	1.1	3	30	<i>Hakea teretifolia</i> , <i>Banksia robur</i>
	L1	0	1.7	80	<i>Gleichenia microphylla</i> , <i>Gahnia sieberiana</i>
WORSTHT1Q4S19	M1	1	2.5	30	<i>Banksia robur</i> , <i>Leptospermum grandifolium</i> , <i>Callistemon citrinus</i>
	L1	0	1.7	20	<i>Gleichenia microphylla</i> , <i>Chorizandra cymbaria</i> , <i>Empodisma minus</i>
WORSTHT1Q5S19	M1	0.6	3.3	40	<i>Epacris paludosa</i> , <i>Leptospermum juniperinum</i>
	L1	0	1.3	25	<i>Chorizandra cymbaria</i> , <i>Gleichenia microphylla</i>
WORSTHT1Q6S19	M1	1.2	3	60	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Persoonia pinifolia</i>
	L1	0	1.3	40	<i>Gleichenia microphylla</i> , <i>Chorizandra cymbaria</i> , <i>Schoenus brevifolius</i>
WORSTHT1Q7S19	M1	2.5	4.3	15	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.5	1	<i>Schoenus brevifolius</i> , <i>Chorizandra cymbaria</i>

Legend

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

Tea Tree Thicket monitoring sites – Spring 2019

Dahlia Swamp – Vegetation structure, dominant species, and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
Transect 1					
DAHT1Q1S19	M1	0.8	3	40	<i>Callistemon citrinus</i> , <i>Hakea teretifolia</i> , <i>Epacris pulchella</i>
	L1	0	1.5	30	<i>Gleichenia microphylla</i> , <i>Empodisma minus</i> , <i>Baumea</i> spp.
DAHT1Q2S19	M1	1.5	3.5	20	<i>Leptospermum juniperinum</i> , <i>Banksia robur</i>
	L1	0	1.5	60	<i>Gleichenia microphylla</i> , <i>Lepidosperma limicola</i> , <i>Chorizandra cymbaria</i>
DAHT1Q3S19	M1	1	3	40	<i>Hakea teretifolia</i> , <i>Callistemon citrinus</i>
	L1	0	2	80	<i>Gleichenia microphylla</i> , <i>Empodisma minus</i>
DAHT1Q4S19	M1	1	2.5	5	<i>Banksia robur</i> , <i>Melaleuca squarrosa</i> , <i>Baeckea linifolia</i>
	L1	0	1.4	60	<i>Gleichenia microphylla</i> , <i>Empodisma minus</i> , <i>Baumea</i> spp.
DAHT1Q5S19	M1	1.4	4	50	<i>Melaleuca squarrosa</i> , <i>Leptospermum juniperinum</i>
	L1	0	1.5	80	<i>Gleichenia microphylla</i> , <i>Chorizandra cymbaria</i>
DAHT1Q6S19	M1	1.5	4.5	60	<i>Melaleuca squarrosa</i> , <i>Leptospermum grandifolium</i>
	L1	0	1.4	50	<i>Gleichenia microphylla</i> , <i>Chorizandra cymbaria</i>
DAHT1Q7S19	M1	0.8	4	30	<i>Melaleuca squarrosa</i> , <i>Callistemon citrinus</i> , <i>Leptospermum juniperinum</i>
	L1	0	0.6	30	<i>Gleichenia microphylla</i> , <i>Baumea rubiginosa</i>
DAHT1Q8S19	M1	1.8	3.5	15	<i>Banksia robur</i> , <i>Leptospermum juniperinum</i> , <i>Leptospermum grandifolium</i>
	L1	0	1.6	40	<i>Gleichenia microphylla</i> , <i>Empodisma minus</i>
DAHT1Q9S19	M1	1.4	4.5	50	<i>Callistemon citrinus</i> , <i>Leptospermum juniperinum</i>
	L1	0	2	95	<i>Gleichenia microphylla</i> , <i>Sporadanthus gracilis</i>
DAHT1Q10S19	M1	2	4	10	<i>Acacia</i> spp., <i>Baeckea linifolia</i> , <i>Melaleuca squarrosa</i>
	L1	0	1.7	90	<i>Gleichenia microphylla</i>
DAHT1Q11S19	M1	2	4	5	<i>Leptospermum juniperinum</i> , <i>Acacia rubida</i> , <i>Banksia robur</i>
	L1	0	2	90	<i>Gleichenia microphylla</i>

Legend

M1: Mid storey 1

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

Estimated cover/abundance data – Tea tree thicket swamps

Tea Tree Thicket monitoring sites – Spring 2019
Swamp 20 – Vegetation cover/abundance

		Transect 1											Transect 2										Transect 3													
Family	Species	S20T1Q1S19	S20T1Q2S19	S20T1Q3S19	S20T1Q4S19	S20T1Q5S19	S20T1Q6S19	S20T1Q7S19	S20T1Q8S19	S20T1Q9S19	S20T1Q10S19	S20T1Q11S19	S20T1Q12S19	S20T1Q13S19	S20T1Q14S19	S20T1Q15S19	S20T1Q16S19	S20T1Q17S19	S20T1Q18S19	S20T1Q19S19	S20T1Q20S19	S20T1Q21S19	S20T1Q22S19	S20T1Q23S19	S20T1Q24S19	S20T1Q25S19	S20T1Q26S19	S20T1Q27S19	S20T1Q28S19	S20T1Q29S19	S20T1Q30S19					
Cunoniaceae	Bauera rubioides		4	4	1		5	2	4	6	4	6	5	6	6	5	6	7	4	4	2		5	6	5	5	4	4	4	6	7	6	3	6	5	
Cyperaceae	Baumea spp.				1	2	1									2	1																			
	Chorizandra cymbaria		1																																	
	Cyathochaeta diandra				1																										1					
	Gahnia sieberiana														3	4				1	3	2	1			1		5	4	4		1		1		
	Lepidosperma neesii	2																										1								
	Ptilothrix clausa		1																																	
	Schoenus melanostachys																			2											1					
Ericaceae	Epacris obtusifolia						3																									1				
	Sprengelia incarnata						2																													
Fabaceae (Mimosoideae)	Acacia longifolia subsp. longifolia									1	1					1					1					4	1	4						5		
	Acacia terminalis						1																													
Gleicheniaceae	Gleichenia dicarpa			1	2																															
	Gleichenia microphylla									1	1	1	1	3	1	5	4	4	5	7	3	4				1	1	5	6	5		5	4	3	4	5
Lauraceae	Cassytha glabella						2																				1	1	5	6	5					
Lindsaeaceae	Lindsaea linearis	1																																		
Myrtaceae	Baeckea linifolia					1	3					3	1	5	3		1	1																		
	Callistemon citrinus	1					1							1			1		1																	
	Eucalyptus piperita				1																															
	Leptospermum grandifolium						1																													
	Leptospermum juniperinum			1	1		1	1			1	4			1					1	1	1						2		5	1	4	4		4	
	Leptospermum squarrosum	1					2					1				2																				
	Melaleuca squarrosa									1		1		1	1		4									4	1	1				1				
Poaceae	Tetraloena turfosa					1																														
Proteaceae	Banksia ericifolia subsp. ericifolia	5	4	1			4	4	5	1	4								1					5												
	Banksia robur		1	4	4	1				1	4	1	4	4	2	4	4	1	4	1	2	4	1	4	1	4	1	4	5	4	5	3	1	4		4
	Hakea dactyloides	5																																		
	Hakea teretifolia		4	4			5	4		4			5					1										1								
	Persoonia pinifolia		1					4																												
	Petrophile pulchella								1																											
Restionaceae	Empodisma minus	3	1	1	3	3	4	2	1	1	1	2	1	3			1	1			1										1	1		1		
	Lepyrodia scariosa						3																													
Xanthorrhoeaceae	Xanthorrhoea resinosa	3	1																																	
	Total	8	9	7	8	5	15	6	4	8	7	8	6	7	6	5	10	7	7	6	6	3	5	3	6	4	7	4	5	3	6	7	4	7	4	

Cover Abundance Scale (Modified Braun Blanquet)
1= cover less than 5% of site and rare
2= cover less than 5% of site and uncommon
3= cover of less than 5% and common
4= cover of 5-20% of site
5= cover of 21-50% of site
6= cover of 51-75% of site
7= cover of greater than 75%

Tea Tree Thicket monitoring sites – Spring 2019

Woronora River 1 – Vegetation cover/abundance

Family	Species	Transect 1					
		WORT1Q1S19	WORT1Q2S19	WORT1Q3S19	WORT1Q4S19	WORT1Q5S19	WORT1Q6S19
Cunoniaceae	<i>Bauera rubioides</i>						4
Cyperaceae	<i>Lepidosperma limicola</i>	2	2				
	<i>Lepidosperma quadrangulatum</i>	2	3		3	1	3
Ericaceae	<i>Epacris obtusifolia</i>	1					
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	2					
Gleicheniaceae	<i>Gleichenia microphylla</i>	6	5	1	2	3	
Myrtaceae	<i>Eucalyptus racemosa</i>	5					
	<i>Eucalyptus sieberi</i>						4
	<i>Leptospermum grandifolium</i>	1					
	<i>Leptospermum juniperinum</i>				1		4
	<i>Melaleuca squarrosa</i>		5				
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	1				5
	<i>Banksia robur</i>		1	1	1	1	
	<i>Hakea teretifolia</i>	5				1	
	<i>Persoonia pinifolia</i>					5	4
	<i>Petrophile pulchella</i>	1					
Restionaceae	<i>Empodisma minus</i>		1	1			
Total		10	7	3	4	5	6

Cover Abundance Scale (Modified Braun Blanquet)

1 = cover less than 5% of site and rare

2 = cover less than 5% of site and uncommon

3 = cover of less than 5% and common

4 = cover of 5-20% of site

5 = cover of 21-50% of site

6 = cover of 51-75% of site

7 = cover of greater than 75%

Tea Tree Thicket monitoring sites – Spring 2019

Woronora River South Arm – Vegetation cover/abundance

Family	Species	Transect 1						
		WORSTHT1Q1S19	WORSTHT1Q2S19	WORSTHT1Q3S19	WORSTHT1Q4S19	WORSTHT1Q5S19	WORSTHT1Q6S19	WORSTHT1Q7S19
Casuarinaceae	<i>Allocasuarina littoralis</i>	1						
Colchicaceae	<i>Burchardia umbellata</i>							1
Cunoniaceae	<i>Bauera microphylla</i>	1						
Cyperaceae	<i>Chorizandra cymbaria</i>	3	3	2	4	4	3	2
	<i>Gahnia sieberiana</i>			5	1	3	1	
	<i>Lepidosperma limicola</i>	3	3				2	
	<i>Lepidosperma neesii</i>	2						
	<i>Schoenus brevifolius</i>		1	1			3	3
	<i>Schoenus lepidosperma</i>				2			
Ericaceae	<i>Epacris paludosa</i>		1	2	2	3	1	
	<i>Sprengelia incarnata</i>	2						
Gleicheniaceae	<i>Gleichenia microphylla</i>	5	3	7	4	3	5	2
Myrtaceae	<i>Baeckea linifolia</i>				1	1		
	<i>Callistemon citrinus</i>				4			
	<i>Leptospermum grandifolium</i>	4	1		4	1	4	
	<i>Leptospermum juniperinum</i>			2	4	3	2	
	<i>Melaleuca squarrosa</i>				1			
Poaceae	<i>Hemarthria uncinata</i>		1					
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5					5	4
	<i>Banksia oblongifolia</i>	4						
	<i>Banksia robur</i>	1	5	4	5	2	4	
	<i>Grevillea oleoides</i>	1						
	<i>Hakea gibbosa</i>	1						
	<i>Hakea teretifolia</i>	3	1	5			5	1
	<i>Persoonia pinifolia</i>						4	
Restionaceae	<i>Empodisma minus</i>	2	3	2	3	2		
	<i>Leptocarpus tenax</i>	2	2	1				
Santalaceae	<i>Leptomeria acida</i>	1						
Total		17	11	10	12	9	12	6

Cover Abundance Scale (Modified Braun Blanquet)

1 = cover less than 5% of site and rare

2 = cover less than 5% of site and uncommon

3 = cover of less than 5% and common

4 = cover of 5-20% of site

5 = cover of 21-50% of site

6 = cover of 51-75% of site

7 = cover of greater than 75%

Tea Tree Thicket monitoring sites – Spring 2019

Dahlia Swamp – Vegetation cover/abundance

Family	Species	Transect 1										
		DAHT1Q1S19	DAHT1Q2S19	DAHT1Q3S19	DAHT1Q4S19	DAHT1Q5S19	DAHT1Q6S19	DAHT1Q7S19	DAHT1Q8S19	DAHT1Q9S19	DAHT1Q10S19	DAHT1Q11S19
Apiaceae	<i>Hydrocotyle laxiflora</i>							1				
Aspleniaceae	<i>Asplenium flabellifolium</i>							1				
Cyperaceae	<i>Baumea rubiginosa</i>							3	2			
	<i>Baumea</i> spp.	2	2	2	2		1	1	2			
	<i>Chorizandra cymbaria</i>	2	2		2	2	2		1	2	1	
	<i>Lepidosperma limicola</i>	2	2	3								
	<i>Lepidosperma quadrangulatum</i>									1		
	<i>Schoenus brevifolius</i>		1									
Dicksoniaceae	<i>Calochlaena dubia</i>							1				
Ericaceae	<i>Epacris paludosa</i>	3										
Fabaceae (Mimosoideae)	<i>Acacia rubida</i>										2	2
Gleicheniaceae	<i>Gleichenia microphylla</i>	5	6	6	6	7	5	5	5	7	7	7
Haloragaceae	<i>Gonocarpus micranthus</i>							2	1			
Lobeliaceae	<i>Lobelia anceps</i>							3				
Myrtaceae	<i>Baeckea linifolia</i>				2						1	
	<i>Callistemon citrinus</i>	5	1	5	1	1	1	4		5		
	<i>Leptospermum grandifolium</i>						4		4		1	
	<i>Leptospermum juniperinum</i>		4			5	1	3	4	3	1	4
	<i>Melaleuca squarrosa</i>		1		2	5	6	5		1	1	
Plantaginaceae	<i>Veronica plebeia</i>								3			
Poaceae	<i>Entolasia stricta</i>	1										
	<i>Tetrarrhena turfosa</i>							1				
Proteaceae	<i>Banksia robur</i>	1	4		2	4			4	1	1	1
	<i>Hakea teretifolia</i>	4	1	5								
Restionaceae	<i>Empodisma minus</i>	3		3	3				3			
	<i>Leptocarpus tenax</i>	1	1	1								
	<i>Sporadanthus gracilis</i>									4		
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	1										
Total		12	11	7	8	6	7	12	10	8	8	4

Cover Abundance Scale (Modified Braun Blanquet)

1 = cover less than 5% of site and rare

2 = cover less than 5% of site and uncommon

3 = cover of less than 5% and common

4 = cover of 5-20% of site

5 = cover of 21-50% of site

6 = cover of 51-75% of site

7 = cover of greater than 75%

Vegetation condition – Tea tree thicket swamps

Tea Tree Thicket monitoring sites – Spring 2019
Swamp 20 – Vegetation condition

		Transect 1											Transect 2											Transect 3													
Family	Species	S20T1Q1S19	S20T1Q2S19	S20T1Q3S19	S20T1Q4S19	S20T1Q5S19	S20T1Q6S19	S20T1Q7S19	S20T2Q1S19	S20T2Q2S19	S20T2Q3S19	S20T2Q4S19	S20T2Q5S19	S20T2Q6S19	S20T2Q7S19	S20T2Q8S19	S20T2Q9S19	S20T2Q10S19	S20T2Q11S19	S20T2Q12S19	S20T2Q13S19	S20T2Q14S19	S20T3Q1S19	S20T3Q2S19	S20T3Q3S19	S20T3Q4S19	S20T3Q5S19	S20T3Q6S19	S20T3Q7S19	S20T3Q8S19	S20T3Q9S19	S20T3Q10S19	S20T3Q11S19	S20T3Q12S19	S20T3Q13S19		
Cunoniaceae	Bauera rubioides		5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	4		5	5	2	5	5	5	5	5	5	5	5	5	5	5	
Cyperaceae	Baumea spp.				5	5	5								5	5																					
	Chorizandra cymbaria		5														5	5																			
	Cyathochaeta diandra				5																											5					
	Gahnia sieberiana													5	4				5	5	5	4		2		4	5	5		5		5	5				
	Lepidosperma neesii	5																			5	5	4		2		4	5	5		5		5	5			
	Ptilothrix debuta		5																															5			
	Schoenus melanostachys																		5													5					
Ericaceae	Epacris obtusifolia						5																											5			
	Sprengelia incarnata						4																														
Fabaceae (Mimosoideae)	Acacia longifolia subsp. longifolia								5	5					5						5			5	5	5								5			
	Acacia terminalis						5																														
Gleicheniaceae	Gleichenia dicarpa			5	5								5	5	4	5	5	5	5	5	5	5			3	5	4	5	5		5	4	5	5	5		
	Gleichenia microphylla								5	5	4	5	5	5	5	5	5	5	5	5	5				3	5	4	5	5		5	4	5	5	5		
Lauraceae	Cassyltha glabella						5																														
Lindsaeaceae	Lindsaea linearis	5																																			
Myrtaceae	Baeckea linifolia					5	5					5	5	5	5		5	5																			
	Callistemon citrinus	5					5						5				5		5																		
	Eucalyptus piperita				5																																
	Leptospermum grandifolium						5																														
	Leptospermum juniperinum			5	5		5	5			5	5		5					5	5	5					5		5	5	5	5	5		5	5		
	Leptospermum squarrosus	5					5					5					5																				
	Melaleuca squarrosa									5		5		5	5		5							5	5	5						5					
Poaceae	Tetrarrhena turfosa					5																															
Proteaceae	Banksia ericifolia subsp. ericifolia	5	5	5			5	5	5	5	5								5				5														
	Banksia robur		5	5	5	5				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5		5	5	
	Hakea dactyloides	5																																			
	Hakea teretifolia		5	5			5	5		5			5						5									5									
	Persoonia pinifolia		5					5																													
	Petrophile pulchella								5																												
Restionaceae	Empodisma minus	5	5	5	4	5	3	5	5	5	5	5	5				5	5		5											5	5		5			
	Lepyrodia scariosa						5																														
Xanthorrhoeaceae	Xanthorrhoea resinosa	4	5																																		
	Total	8	9	7	8	5	15	6	4	8	7	8	6	7	6	5	10	7	7	6	6	3	5	3	6	4	7	4	5	3	6	7	4	7	4		

Condition Scale
1=severe damage/dieback
2=many dead stems
3=some dead branches
4=minor damage
5=healthy

Tea Tree Thicket monitoring sites – Spring 2019

Woronora River 1 – Vegetation condition

Family	Species	Transect 1					
		WORT1Q1S19	WORT1Q2S19	WORT1Q3S19	WORT1Q4S19	WORT1Q5S19	WORT1Q6S19
Cunoniaceae	<i>Bauera rubioides</i>						5
Cyperaceae	<i>Lepidosperma limicola</i>	5	4				
	<i>Lepidosperma quadrangulatum</i>	5	5		5	5	4
Ericaceae	<i>Epacris obtusifolia</i>	5					
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	5					
Gleicheniaceae	<i>Gleichenia microphylla</i>	5	5	1	2	5	
Myrtaceae	<i>Eucalyptus racemosa</i>	5					
	<i>Eucalyptus sieberi</i>						5
	<i>Leptospermum grandifolium</i>	5					
	<i>Leptospermum juniperinum</i>				5		5
	<i>Melaleuca squarrosa</i>		5				
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5				5
	<i>Banksia robur</i>		5	5	5	5	
	<i>Hakea teretifolia</i>	5				5	
	<i>Persoonia pinifolia</i>					5	5
	<i>Petrophile pulchella</i>	5					
Restionaceae	<i>Empodisma minus</i>		5	3			
Total		10	7	3	4	5	6

Condition Scale

- 1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

Tea Tree Thicket monitoring sites – Spring 2019

Woronora River South Arm – Vegetation condition

Family	Species	Transect 1						
		WORSTHT1Q1S19	WORSTHT1Q2S19	WORSTHT1Q3S19	WORSTHT1Q4S19	WORSTHT1Q5S19	WORSTHT1Q6S19	WORSTHT1Q7S19
Casuarinaceae	<i>Allocasuarina littoralis</i>	5						
Colchicaceae	<i>Burchardia umbellata</i>							5
Cunoniaceae	<i>Bauera microphylla</i>	5						
Cyperaceae	<i>Chorizandra cymbaria</i>	4	3	2	3	5	5	5
	<i>Gahnia sieberiana</i>			5	5	5	5	
	<i>Lepidosperma limicola</i>	4	3				5	
	<i>Lepidosperma neesii</i>	5						
	<i>Schoenus brevifolius</i>		5	5			5	5
	<i>Schoenus lepidosperma</i>				5			
Ericaceae	<i>Epacris paludosa</i>		5	5	5	5	5	
	<i>Sprengelia incarnata</i>	4						
Gleicheniaceae	<i>Gleichenia microphylla</i>	3	4	5	4	5	4	5
Myrtaceae	<i>Baeckea linifolia</i>				5	5		
	<i>Callistemon citrinus</i>				5			
	<i>Leptospermum grandifolium</i>	4	3		3	5	5	
	<i>Leptospermum juniperinum</i>			5	5	5	5	
	<i>Melaleuca squarrosa</i>				5			
Poaceae	<i>Hemarthria uncinata</i>		5					
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	3					5	5
	<i>Banksia oblongifolia</i>	4						
	<i>Banksia robur</i>	1	4	5	5	5	5	
	<i>Grevillea oleoides</i>	5						
	<i>Hakea gibbosa</i>	3						
	<i>Hakea teretifolia</i>	4	2	4			5	5
	<i>Persoonia pinifolia</i>						5	
Restionaceae	<i>Empodisma minus</i>	5	4	5	5	5		
	<i>Leptocarpus tenax</i>	5	5	5				
Santalaceae	<i>Leptomeria acida</i>	5						
Total		17	11	10	12	9	12	6

Condition Scale

- 1 = severe damage/dieback
- 2 = many dead stems
- 3 = some dead branches
- 4 = minor damage
- 5 = healthy

Tea Tree Thicket monitoring sites – Spring 2019

Dahlia Swamp – Vegetation condition

Family	Species	Transect 1										
		DAHT1Q1S19	DAHT1Q2S19	DAHT1Q3S19	DAHT1Q4S19	DAHT1Q5S19	DAHT1Q6S19	DAHT1Q7S19	DAHT1Q8S19	DAHT1Q9S19	DAHT1Q10S19	DAHT1Q11S19
Apiaceae	<i>Hydrocotyle laxiflora</i>							5				
Aspleniaceae	<i>Asplenium flabellifolium</i>							5				
Cyperaceae	<i>Baumea rubiginosa</i>							5	5			
	<i>Baumea</i> spp.	5	5	4	5		5	5	5			
	<i>Chorizandra cymbaria</i>	5	4		4	3	3		5	5	5	
	<i>Lepidosperma limicola</i>	5	4	4								
	<i>Lepidosperma quadrangulatum</i>									5		
	<i>Schoenus brevifolius</i>		5									
Dicksoniaceae	<i>Calochlaena dubia</i>							5				
Ericaceae	<i>Epacris paludosa</i>	5										
Fabaceae (Mimosoideae)	<i>Acacia rubida</i>										5	5
Gleicheniaceae	<i>Gleichenia microphylla</i>	4	5	5	4	4	4	4	5	5	5	5
Haloragaceae	<i>Gonocarpus micranthus</i>							5	5			
Lobeliaceae	<i>Lobelia anceps</i>							5				
Myrtaceae	<i>Baeckea linifolia</i>				5						5	
	<i>Callistemon citrinus</i>	5	5	5	5	5	5	5		5		
	<i>Leptospermum grandifolium</i>						3		5		5	
	<i>Leptospermum juniperinum</i>		5			5	1	5	5	4	5	5
	<i>Melaleuca squarrosa</i>		5		5	5	5	5		5	5	
Plantaginaceae	<i>Veronica plebeia</i>								5			
Poaceae	<i>Entolasia stricta</i>	5										
	<i>Tetrarrhena turfosa</i>							5				
Proteaceae	<i>Banksia robur</i>	4	5		5	5			5	5	5	5
	<i>Hakea teretifolia</i>	5	5	5								
Restionaceae	<i>Empodisma minus</i>	5		5	5				5			
	<i>Leptocarpus tenax</i>	5	5	5								
	<i>Sporadanthus gracilis</i>									5		
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	3										
Total		12	11	7	8	6	7	12	10	8	8	4

Condition Scale

- 1 = severe damage/dieback
- 2 = many dead stems
- 3 = some dead branches
- 4 = minor damage
- 5 = healthy

Indicator species data – Tea Tree Thicket swamps

Tea Tree Thicket monitoring sites – Spring 2019

Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 20	<i>Banksia robur</i>	a1	310455.27	6214361.50	5	1
Swamp 20	<i>Banksia robur</i>	a2	310457.62	6214365.43	5	1
Swamp 20	<i>Banksia robur</i>	a3	310465.15	6214367.13	5	1
Swamp 20	<i>Banksia robur</i>	a4	310469.39	6214365.21	1	1
Swamp 20	<i>Banksia robur</i>	a5	310475.60	6214365.47	1	1
Swamp 20	<i>Banksia robur</i>	a6	310478.79	6214365.71	4	1
Swamp 20	<i>Banksia robur</i>	a7	310485.57	6214367.80	4	1
Swamp 20	<i>Banksia robur</i>	a8	310399.70	6214423.58	1	1
Swamp 20	<i>Banksia robur</i>	a9	310404.70	6214426.77	4	1
Swamp 20	<i>Banksia robur</i>	a10	310408.89	6214428.39	4	1
Swamp 20	<i>Banksia robur</i>	a11	310411.65	6214429.69	4	1
Swamp 20	<i>Banksia robur</i>	a12	310415.88	6214430.45	1	1
Swamp 20	<i>Banksia robur</i>	a13	310417.48	6214426.24	4	1
Swamp 20	<i>Banksia robur</i>	a14	310408.44	6214366.91	4	1
Swamp 20	<i>Banksia robur</i>	a15	310415.27	6214370.30	5	1
Swamp 20	<i>Banksia robur</i>	S16	310427.11	6214373.83	4	1
Swamp 20	<i>Banksia robur</i>	a17	310434.27	6214377.25	4	1
Swamp 20	<i>Banksia robur</i>	a18	310442.16	6214384.23	5	1
Swamp 20	<i>Banksia robur</i>	a19	310450.01	6214386.53	5	1
Swamp 20	<i>Banksia robur</i>	a20	310459.13	6214393.03	5	1
Swamp 20	<i>Callistemon citrinus</i>	c1	310391.07	6214390.86	4	1
Swamp 20	<i>Callistemon citrinus</i>	c2	310395.09	6214394.83	4	1
Swamp 20	<i>Callistemon citrinus</i>	c3	310385.00	6214401.00	4	3
Swamp 20	<i>Callistemon citrinus</i>	c4	310400.15	6214426.90	5	2
Swamp 20	<i>Callistemon citrinus</i>	c5	310403.61	6214426.85	4	1
Swamp 20	<i>Callistemon citrinus</i>	c6	310411.33	6214429.85	4	1
Swamp 20	<i>Callistemon citrinus</i>	c7	310418.36	6214430.04	4	1
Swamp 20	<i>Callistemon citrinus</i>	c8	310438.34	6214412.51	4	1
Swamp 20	<i>Callistemon citrinus</i>	c9	310454.99	6214401.25	5	1
Swamp 20	<i>Callistemon citrinus</i>	c10	310457.79	6214389.93	4	1
Swamp 20	<i>Callistemon citrinus</i>	c11	310449.97	6214386.13	4	1
Swamp 20	<i>Callistemon citrinus</i>	c12	310444.84	6214382.19	5	1
Swamp 20	<i>Callistemon citrinus</i>	c13	310431.90	6214374.82	4	1
Swamp 20	<i>Callistemon citrinus</i>	c14	310447.12	6214385.93	4	1
Swamp 20	<i>Callistemon citrinus</i>	c15	310438.75	6214382.02	4	1
Swamp 20	<i>Callistemon citrinus</i>	c16	310419.77	6214425.95	4	1
Swamp 20	<i>Callistemon citrinus</i>	c17	310398.51	6214433.92	5	1
Swamp 20	<i>Callistemon citrinus</i>	c18	310398.09	6214435.40	5	1
Swamp 20	<i>Callistemon citrinus</i>	c19	310397.50	6214431.03	5	1
Swamp 20	<i>Callistemon citrinus</i>	c20	310402.71	6214422.51	4	1
Swamp 20	<i>Leptospermum juniperinum</i>	b1	310401.96	6214425.99	4	1
Swamp 20	<i>Leptospermum juniperinum</i>	b2	310405.89	6214424.43	4	1
Swamp 20	<i>Leptospermum juniperinum</i>	b3	310409.68	6214427.19	1	1
Swamp 20	<i>Leptospermum juniperinum</i>	b4	310412.45	6214428.34	1	1
Swamp 20	<i>Leptospermum juniperinum</i>	b5	310417.16	6214429.64	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b6	310421.75	6214426.19	4	1
Swamp 20	<i>Leptospermum juniperinum</i>	b7	310413.32	6214368.93	5	1

Tea Tree Thicket monitoring sites – Spring 2019

Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 20	<i>Leptospermum juniperinum</i>	b8	310423.37	6214371.53	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b9	310439.99	6214380.02	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b10	310445.23	6214384.01	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b11	310452.15	6214388.96	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b12	310460.69	6214395.22	4	1
Swamp 20	<i>Leptospermum juniperinum</i>	b13	310468.02	6214367.89	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b14	310468.09	6214372.94	4	1
Swamp 20	<i>Leptospermum juniperinum</i>	b15	310433.42	6214360.21	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b16	310441.47	6214361.07	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b17	310429.03	6214358.08	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b18	310431.14	6214359.54	5	1
Swamp 20	<i>Leptospermum juniperinum</i>	b19	310477.20	6214371.19	4	1
Swamp 20	<i>Leptospermum juniperinum</i>	b20	310445.44	6214365.41	5	1
Woronora River 1	<i>Banksia robur</i>	a41	306401.70	6214962.98	1	1
Woronora River 1	<i>Banksia robur</i>	a42	306407.92	6214965.22	5	1
Woronora River 1	<i>Banksia robur</i>	a43	306404.19	6214974.24	1	1
Woronora River 1	<i>Banksia robur</i>	a44	306419.95	6214966.04	2	1
Woronora River 1	<i>Banksia robur</i>	a45	306419.00	6214976.87	1	1
Woronora River 1	<i>Banksia robur</i>	a46	306414.62	6214957.67	4	1
Woronora River 1	<i>Banksia robur</i>	a47	306409.14	6214956.21	3	1
Woronora River 1	<i>Banksia robur</i>	a48	306423.67	6214951.13	1	1
Woronora River 1	<i>Banksia robur</i>	a49	306428.82	6214945.20	4	1
Woronora River 1	<i>Banksia robur</i>	a50	306431.82	6214934.92	4	1
Woronora River 1	<i>Banksia robur</i>	a51	306434.41	6214924.93	5	1
Woronora River 1	<i>Banksia robur</i>	a52	306427.73	6214912.51	4	1
Woronora River 1	<i>Banksia robur</i>	a53	306427.12	6214906.48	4	1
Woronora River 1	<i>Banksia robur</i>	a54	306431.52	6214892.40	5	4
Woronora River 1	<i>Banksia robur</i>	a55	306434.82	6214875.09	5	3
Woronora River 1	<i>Banksia robur</i>	a56	306424.89	6214882.73	4	1
Woronora River 1	<i>Banksia robur</i>	a57	306419.65	6214892.85	5	1
Woronora River 1	<i>Banksia robur</i>	a58	306411.72	6214874.18	1	1
Woronora River 1	<i>Banksia robur</i>	a59	306420.26	6214869.80	1	1
Woronora River 1	<i>Banksia robur</i>	a60	306417.93	6214873.32	4	1
Woronora River 1	<i>Callistemon citrinus</i>	c41	306401.96	6214970.47	5	1
Woronora River 1	<i>Callistemon citrinus</i>	c42	306400.42	6214971.53	5	1
Woronora River 1	<i>Callistemon citrinus</i>	c43	306417.54	6214974.53	5	1
Woronora River 1	<i>Callistemon citrinus</i>	c44	306434.12	6214937.53	3	1
Woronora River 1	<i>Callistemon citrinus</i>	c45	306429.56	6214936.66	4	1
Woronora River 1	<i>Callistemon citrinus</i>	c46	306432.67	6214913.81	5	3
Woronora River 1	<i>Callistemon citrinus</i>	c47	306435.93	6214898.93	5	3
Woronora River 1	<i>Callistemon citrinus</i>	c48	306423.54	6214886.18	4	1
Woronora River 1	<i>Callistemon citrinus</i>	c49	306416.34	6214877.50	5	1
Woronora River 1	<i>Callistemon citrinus</i>	c50	306428.78	6214885.46	4	1
Woronora River 1	<i>Callistemon citrinus</i>	c51	306445.06	6214897.96	4	1
Woronora River 1	<i>Callistemon citrinus</i>	c52	306439.92	6214899.70	5	3
Woronora River 1	<i>Callistemon citrinus</i>	c53	306431.61	6214865.05	4	5
Woronora River 1	<i>Callistemon citrinus</i>	c54	306421.52	6214876.11	5	1

Tea Tree Thicket monitoring sites – Spring 2019

Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Woronora River 1	<i>Callistemon citrinus</i>	c55	306434.79	6214891.97	5	4
Woronora River 1	<i>Callistemon citrinus</i>	c56	306435.89	6214894.20	5	1
Woronora River 1	<i>Callistemon citrinus</i>	c57	306439.85	6214903.03	4	1
Woronora River 1	<i>Callistemon citrinus</i>	c58	306438.61	6214920.13	4	1
Woronora River 1	<i>Callistemon citrinus</i>	c59	306438.42	6214920.80	5	1
Woronora River 1	<i>Callistemon citrinus</i>	c60	306427.60	6214951.55	5	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b41	306439.60	6214936.06	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b42	306436.96	6214929.93	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b43	306436.94	6214922.13	4	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b44	306443.17	6214912.99	4	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b45	306439.63	6214908.47	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b46	306437.11	6214900.04	5	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b47	306447.18	6214894.70	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b48	306442.37	6214888.69	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b49	306442.93	6214884.36	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b50	306436.15	6214882.01	4	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b51	306432.03	6214867.55	3	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b52	306423.65	6214875.75	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b53	306418.08	6214883.74	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b54	306426.43	6214885.20	3	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b55	306418.92	6214893.11	5	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b56	306419.74	6214886.73	4	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b57	306416.18	6214886.93	5	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b58	306419.65	6214877.42	1	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b59	306416.20	6214868.25	5	1
Woronora River 1	<i>Leptospermum juniperinum</i>	b60	306418.71	6214872.68	5	1
Woronora South Arm	<i>Banksia robur</i>	a21	306406.69	6213941.19	3	1
Woronora South Arm	<i>Banksia robur</i>	a22	306411.29	6213946.13	3	1
Woronora South Arm	<i>Banksia robur</i>	a23	306414.41	6213950.56	4	1
Woronora South Arm	<i>Banksia robur</i>	a24	306425.46	6213958.65	1	1
Woronora South Arm	<i>Banksia robur</i>	a25	306425.28	6213950.71	4	1
Woronora South Arm	<i>Banksia robur</i>	a26	306430.15	6213944.57	4	1
Woronora South Arm	<i>Banksia robur</i>	a27	306433.83	6213944.62	1	1
Woronora South Arm	<i>Banksia robur</i>	a28	306433.77	6213939.06	4	1
Woronora South Arm	<i>Banksia robur</i>	a29	306431.10	6213934.79	5	1
Woronora South Arm	<i>Banksia robur</i>	a30	306436.40	6213926.17	5	1
Woronora South Arm	<i>Banksia robur</i>	a31	306439.87	6213923.56	4	1
Woronora South Arm	<i>Banksia robur</i>	a32	306438.50	6213918.00	5	1
Woronora South Arm	<i>Banksia robur</i>	a33	306434.61	6213916.78	5	1
Woronora South Arm	<i>Banksia robur</i>	a34	306429.51	6213920.71	5	1
Woronora South Arm	<i>Banksia robur</i>	a35	306427.73	6213921.53	3	1
Woronora South Arm	<i>Banksia robur</i>	a36	306423.98	6213922.93	4	1
Woronora South Arm	<i>Banksia robur</i>	a37	306419.51	6213928.79	4	1
Woronora South Arm	<i>Banksia robur</i>	a38	306414.11	6213937.56	5	1
Woronora South Arm	<i>Banksia robur</i>	a39	306410.99	6213937.46	5	1
Woronora South Arm	<i>Banksia robur</i>	a40	306405.39	6213939.72	1	1

Tea Tree Thicket monitoring sites – Spring 2019

Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Woronora South Arm	<i>Callistemon citrinus</i>	c21	306408.01	6213944.25	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c22	306421.87	6213957.30	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c23	306427.84	6213946.92	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c24	306427.10	6213942.16	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c25	306434.06	6213937.33	4	1
Woronora South Arm	<i>Callistemon citrinus</i>	c26	306436.15	6213932.97	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c27	306434.43	6213929.13	4	1
Woronora South Arm	<i>Callistemon citrinus</i>	c28	306438.52	6213923.15	4	1
Woronora South Arm	<i>Callistemon citrinus</i>	c29	306417.65	6213935.40	4	1
Woronora South Arm	<i>Callistemon citrinus</i>	c30	306432.75	6213918.33	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c31	306409.88	6213954.72	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c32	306408.64	6213956.81	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c33	306418.10	6213964.33	4	1
Woronora South Arm	<i>Callistemon citrinus</i>	c34	306417.39	6213967.54	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c35	306414.54	6213972.55	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c36	306414.92	6213971.23	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c37	306413.26	6213972.52	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c38	306421.80	6213975.70	5	1
Woronora South Arm	<i>Callistemon citrinus</i>	c39	306430.51	6213976.11	3	1
Woronora South Arm	<i>Callistemon citrinus</i>	c40	306429.30	6213978.34	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b21	306405.10	6213950.32	3	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b22	306409.63	6213955.93	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b23	306413.08	6213961.84	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b24	306416.14	6213964.15	1	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b25	306420.73	6213965.82	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b26	306425.59	6213967.32	1	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b27	306419.34	6213972.21	3	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b28	306415.96	6213973.93	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b29	306413.38	6213971.53	1	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b30	306408.45	6213971.05	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b31	306419.78	6213979.86	3	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b32	306426.01	6213980.72	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b33	306423.06	6213984.23	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b34	306419.58	6213985.68	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b35	306420.84	6213991.77	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b36	306419.52	6213998.72	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b37	306423.52	6213971.34	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b38	306412.54	6213969.16	5	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b39	306408.15	6213974.08	4	1
Woronora South Arm	<i>Leptospermum juniperinum</i>	b40	306409.23	6213964.11	4	1
Dahlia Swamp	<i>Banksia robur</i>	a61	306129.26	6212863.29	4	1
Dahlia Swamp	<i>Banksia robur</i>	a62	306134.54	6212866.25	4	1
Dahlia Swamp	<i>Banksia robur</i>	a63	306132.78	6212870.01	3	1
Dahlia Swamp	<i>Banksia robur</i>	a64	306127.95	6212871.72	1	1
Dahlia Swamp	<i>Banksia robur</i>	a65	306125.30	6212876.39	4	1
Dahlia Swamp	<i>Banksia robur</i>	a66	306123.34	6212877.65	1	1
Dahlia Swamp	<i>Banksia robur</i>	a67	306122.03	6212880.57	4	1

Tea Tree Thicket monitoring sites – Spring 2019

Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Dahlia Swamp	<i>Banksia robur</i>	a68	306119.44	6212882.36	4	1
Dahlia Swamp	<i>Banksia robur</i>	a69	306112.90	6212885.99	4	1
Dahlia Swamp	<i>Banksia robur</i>	a70	306112.61	6212888.50	4	1
Dahlia Swamp	<i>Banksia robur</i>	a71	306115.38	6212893.47	3	1
Dahlia Swamp	<i>Banksia robur</i>	a72	306120.71	6212897.02	1	1
Dahlia Swamp	<i>Banksia robur</i>	a73	306125.45	6212892.84	1	1
Dahlia Swamp	<i>Banksia robur</i>	a74	306119.46	6212886.20	4	1
Dahlia Swamp	<i>Banksia robur</i>	a75	306122.35	6212884.16	4	1
Dahlia Swamp	<i>Banksia robur</i>	a76	306126.69	6212880.57	1	1
Dahlia Swamp	<i>Banksia robur</i>	a77	306134.99	6212874.83	3	1
Dahlia Swamp	<i>Banksia robur</i>	a78	306136.14	6212871.66	4	1
Dahlia Swamp	<i>Banksia robur</i>	a79	306150.43	6212867.42	4	1
Dahlia Swamp	<i>Banksia robur</i>	a80	306139.36	6212861.48	4	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c61	306130.47	6212864.63	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c62	306136.08	6212869.24	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c63	306129.3	6212874.48	4	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c64	306117.94	6212878.38	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c65	306122.20	6212898.73	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c66	306130.24	6212875.94	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c67	306134.07	6212874.14	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c68	306137.69	6212871.37	4	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c69	306150.27	6212867.68	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c70	306147.14	6212864.33	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c71	306127.46	6212862.59	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c72	306134.04	6212863.52	4	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c73	306116.73	6212879.65	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c74	306116.94	6212887.24	5	2
Dahlia Swamp	<i>Callistemon citrinus</i>	c75	306133.45	6212879.31	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c76	306135.40	6212872.90	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c77	306141.41	6212868.85	5	1
Dahlia Swamp	<i>Callistemon citrinus</i>	c78	306153.46	6212875.00	5	2
Dahlia Swamp	<i>Callistemon citrinus</i>	c79	306164.34	6212866.90	5	5
Dahlia Swamp	<i>Callistemon citrinus</i>	c80	306151.94	6212848.69	5	4
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b61	306125.84	6212862.59	4	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b62	306131.98	6212862.11	4	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b63	306134.30	6212868.23	5	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b64	306130.34	6212870.05	5	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b65	306127.42	6212875.87	3	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b66	306120.77	6212875.74	3	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b67	306117.66	6212878.90	1	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b68	306116.24	6212885.35	3	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b69	306123.19	6212888.75	1	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b70	306129.90	6212883.23	1	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b71	306133.54	6212877.43	3	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b72	306136.49	6212877.77	3	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b73	306158.83	6212870.30	1	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b74	306154.18	6212861.01	3	1

Tea Tree Thicket monitoring sites – Spring 2019

Condition and Reproductive Rating for Swamp Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b75	306152.04	6212847.75	3	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b76	306145.25	6212843.91	5	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b77	306137.61	6212847.82	4	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b78	306135.85	6212856.40	4	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b79	306132.39	6212848.43	4	1
Dahlia Swamp	<i>Leptospermum juniperinum</i>	b80	306128.16	6212855.34	1	1

NB: Shaded rows indicate dead individuals

Condition Scale

1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

Reproductive Status:

1 = nil
 2 = sparse (occasional flowers only)
 3 = low (under 25 percent of potential)
 4 = moderate (25 to 75 percent of potential)
 5 = high (over 75 percent of potential flowering)

Appendix G : Riparian vegetation monitoring raw data

*Vegetation structure, dominant species and
estimated cover for each stratum – Riparian sites*

Riparian monitoring sites – Spring 2019

Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
MRIP01S19	T	15	15	5	<i>Eucalyptus sieberi</i>
	M2	0.2	2.5	25	<i>Lomatia myricoides</i> , <i>Acacia obtusifolia</i> , <i>Tristania neriifolia</i>
	M1	5	10	15	<i>Allocasuarina littoralis</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.1	60	<i>Gleichenia microphylla</i> , <i>Bauera rubioides</i> , <i>Eurychorda complanata</i>
MRIP02S19	T	8	12	5	<i>Angophora costata</i> , <i>Eucalyptus piperita</i>
	M2	0.2	3	20	<i>Dodonaea triquetra</i> , <i>Acacia longifolia</i> subsp. <i>longifolia</i>
	M1	2	6	10	<i>Allocasuarina littoralis</i>
	L1	0	1	25	<i>Sticherus flabellatus</i> var. <i>flabellatus</i> , <i>Gleichenia microphylla</i> , <i>Bauera rubioides</i>
MRIP03S19	T	10	15	3	<i>Eucalyptus agglomerata</i> , <i>Angophora costata</i>
	M2	1.2	3	5	<i>Lomatia myricoides</i> , <i>Persoonia pinifolia</i>
	M1	6	8	30	<i>Acacia obtusifolia</i> , <i>Allocasuarina littoralis</i> , <i>Leptospermum morrisonii</i>
	L1	0	1.2	40	<i>Gleichenia microphylla</i> , <i>Bauera rubioides</i>
MRIP04S19	T	8	10	2	<i>Corymbia gummifera</i> , <i>Angophora costata</i>
	M1	1.5	8	35	<i>Allocasuarina littoralis</i> , <i>Stenocarpus salignus</i> , <i>Acacia obtusifolia</i>
	L1	0	0.6	1	<i>Entolasia stricta</i> , <i>Schoenus melanostachys</i> , <i>Isolepis</i> spp.
MRIP05S19	T	12	17	10	<i>Eucalyptus piperita</i> , <i>Eucalyptus sieberi</i>
	M2	0.2	1.5	30	<i>Hibbertia nitida</i> ▲2RC-, <i>Lambertia formosa</i>
	M1	2	5	40	<i>Allocasuarina littoralis</i> , <i>Dodonaea triquetra</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	10	<i>Schoenus melanostachys</i> , <i>Sporadanthus gracilis</i> , <i>Bauera rubioides</i>
MRIP06S19	T	5	15	5	<i>Eucalyptus sieberi</i> , <i>Eucalyptus piperita</i>
	M2	0.2	1.5	5	<i>Banksia oblongifolia</i> , <i>Dodonaea triquetra</i> , <i>Prostanthera linearis</i>
	M1	1.5	5	30	<i>Allocasuarina littoralis</i> , <i>Lomatia myricoides</i>
	L1	0	1.4	10	<i>Schoenus melanostachys</i> , <i>Sporadanthus gracilis</i> , <i>Bauera rubioides</i>
MRIP07S19	T	12	15	5	<i>Eucalyptus piperita</i>
	M1	0.6	4	35	<i>Allocasuarina littoralis</i> , <i>Lomatia myricoides</i> , <i>Dodonaea triquetra</i>
	L1	0	1.8	40	<i>Sticherus flabellatus</i> var. <i>flabellatus</i> , <i>Bauera rubioides</i> , <i>Baumea juncea</i>
MRIP08S19	M1	0.8	3.5	35	<i>Allocasuarina littoralis</i> , <i>Lomatia myricoides</i> , <i>Tristania neriifolia</i>
	L1	0	0.8	40	<i>Lomandra fluviatilis</i> ▲3RCa

Legend

T: Upper storey

M1: Mid storey 1

M2: Mid storey 2

L1: Lower stratum 1

Height values provide a guide to the vegetation layers, or strata, recorded per plot. Some overlap of values will occur.

Percent foliage cover includes all living vegetation per strata. Woody debris, litter and ground layer dieback, soil and rock are not included in these values.

▲ RoTAP species

2: Geographic range in Australia less than 100 km

3: Geographic range in Australia more than 100 km

R: Rare in Australia but does not have an identifiable threat

C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve

a: 1000 plants or more are known to occur within a conservation reserve(s)

-: reserved population size is not accurately known

Estimated cover/abundance data – Riparian sites

Riparian monitoring sites – Spring 2019

Vegetation cover/abundance

Family	Species	MRIP01S19	MRIP02S19	MRIP03S19	MRIP04S19	MRIP05S19	MRIP06S19	MRIP07S19	MRIP08S19
Apiaceae	<i>Actinotus minor</i>						1		
	<i>Xanthosia pilosa</i>					1	2		
	<i>Xanthosia tridentata</i>	3					2		
Asteraceae	<i>Gamochaeta</i> spp.*		1						
Blandfordiaceae	<i>Blandfordia nobilis</i>	1							
Casuarinaceae	<i>Allocasuarina distyla</i>							1	1
	<i>Allocasuarina littoralis</i>	4	4	4	5	4	4	3	4
Centrolepidaceae	<i>Centrolepis strigosa</i> subsp. <i>strigosa</i>		1						
Cunoniaceae	<i>Bauera rubioides</i>	4	2	4	1	4	3	4	2
	<i>Callicoma serratifolia</i>		3					4	
	<i>Ceratopetalum apetalum</i>		1					1	
	<i>Ceratopetalum gummiferum</i>					1			
Cupressaceae	<i>Callitris rhomboidea</i>				4				
Cyperaceae	<i>Baumea juncea</i>							3	1
	<i>Baumea</i> spp.					1			
	<i>Caustis pentandra</i>			1					
	<i>Chorizandra cymbaria</i>				1		1		
	<i>Cyathochaeta diandra</i>						1		
	<i>Cyperus gracilis</i>						1		
	<i>Eleocharis gracilis</i>		1						
	<i>Gymnoschoenus sphaerocephalus</i>	3							
	<i>Isolepis cernua</i>		2						
	<i>Isolepis</i> spp.				3				
	<i>Lepidosperma laterale</i>		1			3			
	<i>Schoenus melanostachys</i>	3	2	3	2	4	4	3	
Dennstaedtiaceae	<i>Pteridium esculentum</i>					1	1		
Dilleniaceae	<i>Hibbertia aspera</i>								1
	<i>Hibbertia nitida</i> ▲2RC-	2	1	2		4	1	2	1
Doryanthaceae	<i>Doryanthes excelsa</i>		1			1	1		
Droseraceae	<i>Drosera binata</i>	3							
	<i>Drosera peltata</i>						1		
	<i>Drosera spatulata</i>		2						
Ericaceae	<i>Epacris longiflora</i>								1
	<i>Epacris microphylla</i>	3							
	<i>Epacris obtusifolia</i>	2	1				1	2	
	<i>Epacris pulchella</i>						1		
	<i>Leucopogon amplexicaulis</i>		1			1	1	1	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>						1		
	<i>Monotoca scoparia</i>					1			
Euphorbiaceae	<i>Woollsia pungens</i>						1		
	<i>Micrantheum ericoides</i>					1	1		
Fabaceae (Faboideae)	<i>Pseudanthus pimeleoides</i>	2						2	3
	<i>Aotus ericoides</i>							1	
	<i>Dillwynia floribunda</i>	2							
	<i>Gompholobium glabratum</i>								1
	<i>Pultenaea blakelyi</i>		2						

Riparian monitoring sites – Spring 2019

Vegetation cover/abundance

Family	Species	MRIP01S19	MRIP02S19	MRIP03S19	MRIP04S19	MRIP05S19	MRIP06S19	MRIP07S19	MRIP08S19
	<i>Pultenaea stipularis</i>						1		
Fabaceae (Mimosoideae)	<i>Acacia linifolia</i>					1			
	<i>Acacia longifolia</i> subsp. <i>longifolia</i>		2			2	2	2	1
	<i>Acacia obtusifolia</i>	4	1	5	4				
	<i>Acacia terminalis</i>						1	1	
	<i>Acacia ulicifolia</i>						1		
Gleicheniaceae	<i>Gleichenia microphylla</i>	5	4	5				3	
	<i>Sticherus flabellatus</i> var. <i>flabellatus</i>		5					4	
Goodeniaceae	<i>Dampiera stricta</i>					1			
Haloragaceae	<i>Gonocarpus micranthus</i>		1						
	<i>Gonocarpus teucroides</i>		2		1	1	2	1	1
Juncaceae	<i>Juncus prismatocarpus</i>		1		2				
Juncaginaceae	<i>Triglochin procera</i>		3	1					
Lamiaceae	<i>Prostanthera linearis</i>	2	2	1	3	3	4		
Lauraceae	<i>Cassytha glabella</i>		2	1		1		3	4
Loganiaceae	<i>Logania albiflora</i>		2	1	1			1	3
Lomandraceae	<i>Lomandra cylindrica</i>					1			
	<i>Lomandra fluviatilis</i> ▲3RCa	1			3			2	5
	<i>Lomandra gracilis</i>	1				3			
	<i>Lomandra longifolia</i>	1			1	3		1	1
	<i>Lomandra obliqua</i>					1			
Myrtaceae	<i>Angophora costata</i>		4	1	1		1		1
	<i>Baeckea linifolia</i>	3				1	3	3	
	<i>Callistemon citrinus</i>				4			1	
	<i>Corymbia gummifera</i>				1				
	<i>Darwinia fascicularis</i>	1							
	<i>Eucalyptus agglomerata</i>			1					
	<i>Eucalyptus piperita</i>		1	2		4	1	4	
	<i>Eucalyptus sieberi</i>	4				1	1		
	<i>Kunzea ambigua</i>							1	
	<i>Leptospermum grandifolium</i>						2		
	<i>Leptospermum morrisonii</i>	2	2	4	4		1	1	
	<i>Leptospermum polygalifolium</i>		1			1	1	1	1
	<i>Leptospermum squarrosum</i>			1	1	2	2	1	
	<i>Leptospermum trinervium</i>				1		1		
	<i>Melaleuca squarrosa</i>						1	2	
	<i>Tristania neriifolia</i>	4					1		2
	<i>Tristaniopsis collina</i>				1				
	<i>Tristaniopsis laurina</i>							1	4
Orchidaceae	<i>Cryptostylis erecta</i>					1			
Phormiaceae	<i>Dianella caerulea</i>			1		1		1	
Phyllanthaceae	<i>Phyllanthus hirtellus</i>					1	1		
Pittosporaceae	<i>Billardiera scandens</i>		1			1	1		
Poaceae	<i>Anisopogon avenaceus</i>					1			
	<i>Austrostipa pubescens</i>							1	
	<i>Austrostipa</i> spp.						1		
	<i>Entolasia stricta</i>	2	3	2	3	3	2	2	1

Riparian monitoring sites – Spring 2019

Vegetation cover/abundance

Family	Species	MRIP01S19	MRIP02S19	MRIP03S19	MRIP04S19	MRIP05S19	MRIP06S19	MRIP07S19	MRIP08S19
	<i>Microlaena stipoides</i>				1				1
	<i>Tetrarrhena juncea</i>					1			
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	1	2	1	4	2	3	1
	<i>Banksia marginata</i>		1	1			1	1	
	<i>Banksia oblongifolia</i>						2		
	<i>Banksia serrata</i>			1		1			
	<i>Grevillea diffusa</i> subsp. <i>diffusa</i>			1					
	<i>Hakea dactyloides</i>	1		1		2	1		
	<i>Hakea salicifolia</i>		1	1	1	2	1	4	1
	<i>Hakea teretifolia</i>	1			1	1	2		4
	<i>Lambertia formosa</i>					4			
	<i>Lomatia myricoides</i>	4		4	1		4	3	4
	<i>Lomatia silaifolia</i>					1			
	<i>Persoonia pinifolia</i>	3	2	3	1	1	3	3	3
	<i>Petrophile pulchella</i>					2			
	<i>Stenocarpus salignus</i>				4			2	1
Restionaceae	<i>Chordifex dimorphus</i>						1		1
	<i>Chordifex fastigiatus</i>	3							
	<i>Empodisma minus</i>		2			3	1		
	<i>Eurychorda complanata</i>	4	1	1					
	<i>Leptocarpus tenax</i>	1			1	1	1		
	<i>Lepyrodia scariosa</i>	1					2		
	<i>Sporadanthus gracilis</i>	3			1	3	3	3	
Rhamnaceae	<i>Pomaderris elliptica</i> subsp. <i>elliptica</i>		1	1				1	
Rubiaceae	<i>Opercularia aspera</i>				1	1	1	1	1
Rutaceae	<i>Leionema dentatum</i>							2	
	<i>Leionema diosmeum</i>	1	1						
	<i>Nematolepis squamea</i> subsp. <i>squamea</i>	1			1		1		
Santalaceae	<i>Leptomeria acida</i>					1			
Sapindaceae	<i>Dodonaea triquetra</i>	2	4	3	3	4	4	3	3
Scrophulariaceae	<i>Gratiola peruviana</i>		1		1				
Smilacaceae	<i>Smilax glycyphylla</i>		2					1	1
Sterculiaceae	<i>Lasiopetalum ferrugineum</i>	1	1		1			1	1
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>					1			1
Xanthorrhoeaceae	<i>Xanthorrhoea media</i>	2				2			
Xyridaceae	<i>Xyris gracilis</i>						1		
	<i>Xyris operculata</i>	1							
	Total	40	45	29	35	52	57	46	33

Cover Abundance Scale (Modified Braun Blanquet)

- 1 = cover less than 5% of site and rare
 2 = cover less than 5% of site and uncommon
 3 = cover of less than 5% and common
 4 = cover of 5-20% of site
 5 = cover of 21-50% of site
 6 = cover of 51-75% of site
 7 = cover of greater than 75%

* Non-native species

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
 3: Geographic range in Australia more than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 a: 1000 plants or more are known to occur within a conservation reserve(s)
 -: reserved population size is not accurately known

Vegetation condition – Riparian sites

Riparian monitoring sites – Spring 2019

Vegetation condition

Family	Species	MRIP01S19	MRIP02S19	MRIP03S19	MRIP04S19	MRIP05S19	MRIP06S19	MRIP07S19	MRIP08S19
Apiaceae	<i>Actinotus minor</i>					5			
	<i>Xanthosia pilosa</i>				5	5			
	<i>Xanthosia tridentata</i>	5				5			
Asteraceae	<i>Gamochaeta</i> spp. *		5						
Blandfordiaceae	<i>Blandfordia nobilis</i>	5							
Casuarinaceae	<i>Allocasuarina distyla</i>						5	5	
	<i>Allocasuarina littoralis</i>	5	5	5	5	5	5	5	5
Centrolepidaceae	<i>Centrolepis strigosa</i> subsp. <i>strigosa</i>		5						
Cunoniaceae	<i>Bauera rubioides</i>	5	5	4	5	5	5	5	5
	<i>Callicoma serratifolia</i>		5				5		
	<i>Ceratopetalum apetalum</i>		4				5		
	<i>Ceratopetalum gummiiferum</i>					5			
Cupressaceae	<i>Callitris rhomboidea</i>				5				
Cyperaceae	<i>Baumea juncea</i>						5	5	
	<i>Baumea</i> spp.					5			
	<i>Caustis pentandra</i>			5					
	<i>Chorizandra cymbaria</i>				5	5			
	<i>Cyathochaeta diandra</i>					5			
	<i>Cyperus gracilis</i>					5			
	<i>Eleocharis gracilis</i>		5						
	<i>Gymnoschoenus sphaerocephalus</i>	5							
	<i>Isolepis cernua</i>		5						
	<i>Isolepis</i> spp.				5				
	<i>Lepidosperma laterale</i>		5			5			
	<i>Schoenus melanostachys</i>	5	5	5	5	5	5	3	
Dennstaedtiaceae	<i>Pteridium esculentum</i>					5	5		
Dilleniaceae	<i>Hibbertia aspera</i>								5
	<i>Hibbertia nitida</i> ▲2RC-	5	5	5		5	5	5	5
Doryanthaceae	<i>Doryanthes excelsa</i>		5			5	5		
Droseraceae	<i>Drosera binata</i>	5							
	<i>Drosera peltata</i>					5			
	<i>Drosera spatulata</i>		5						
Ericaceae	<i>Epacris longiflora</i>								5
	<i>Epacris microphylla</i>	5							
	<i>Epacris obtusifolia</i>	5	5			5	5		
	<i>Epacris pulchella</i>					5			
	<i>Leucopogon amplexicaulis</i>		5			5	5	5	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>					5			
	<i>Monotoca scoparia</i>					5			
	<i>Woollsia pungens</i>					5			
Euphorbiaceae	<i>Micrantheum ericoides</i>					5	5		
	<i>Pseudanthus pimeleoides</i>	5						5	5
Fabaceae (Faboideae)	<i>Aotus ericoides</i>						5		
	<i>Dillwynia floribunda</i>	5							
	<i>Gompholobium glabratum</i>								5
	<i>Pultenaea blakelyi</i>		5						

Riparian monitoring sites – Spring 2019

Vegetation condition

Family	Species	MRIP01S19	MRIP02S19	MRIP03S19	MRIP04S19	MRIP05S19	MRIP06S19	MRIP07S19	MRIP08S19
	<i>Pultenaea stipularis</i>					5			
Fabaceae (Mimosoideae)	<i>Acacia linifolia</i>					5			
	<i>Acacia longifolia</i> subsp. <i>longifolia</i>		5			5	5	5	5
	<i>Acacia obtusifolia</i>	5	5	5	5				
	<i>Acacia terminalis</i>						5	5	
	<i>Acacia ulicifolia</i>						5		
Gleicheniaceae	<i>Gleichenia microphylla</i>	5	5	4				3	
	<i>Sticherus flabellatus</i> var. <i>flabellatus</i>		5					3	
Goodeniaceae	<i>Dampiera stricta</i>					5			
Haloragaceae	<i>Gonocarpus micranthus</i>		5						
	<i>Gonocarpus teucroides</i>		5		5	5	5	5	5
Juncaceae	<i>Juncus prismatocarpus</i>		5		5				
Juncaginaceae	<i>Triglochin procera</i>		5	5					
Lamiaceae	<i>Prostanthera linearis</i>	5	5	1	5	5	5		
Lauraceae	<i>Cassytha glabella</i>		4	5		5		5	5
Loganiaceae	<i>Logania albiflora</i>		5	5	5			5	5
Lomandraceae	<i>Lomandra cylindrica</i>					5			
	<i>Lomandra fluviatilis</i> ▲3RCa	4			5			5	5
	<i>Lomandra gracilis</i>	5				5			
	<i>Lomandra longifolia</i>	5			5	5		5	5
	<i>Lomandra obliqua</i>					5			
Myrtaceae	<i>Angophora costata</i>		5	5	5		5		5
	<i>Baeckea linifolia</i>	4				5	5	5	
	<i>Callistemon citrinus</i>				5			5	
	<i>Corymbia gummifera</i>				5				
	<i>Darwinia fascicularis</i>	5							
	<i>Eucalyptus agglomerata</i>			3					
	<i>Eucalyptus piperita</i>		5	5		5	5	5	
	<i>Eucalyptus sieberi</i>	5				5	5		
	<i>Kunzea ambigua</i>							5	
	<i>Leptospermum grandifolium</i>						5		
	<i>Leptospermum morrisonii</i>	3	5	5	5		5	4	
	<i>Leptospermum polygalifolium</i>		5			5	5	5	3
	<i>Leptospermum squarrosum</i>			5	5	5	5	5	
	<i>Leptospermum trinervium</i>				5		5		
	<i>Melaleuca squarrosa</i>						5	5	
	<i>Tristania neriifolia</i>	3					5		5
	<i>Tristaniopsis collina</i>				5				
	<i>Tristaniopsis laurina</i>							4	3
Orchidaceae	<i>Cryptostylis erecta</i>					5			
Phormiaceae	<i>Dianella caerulea</i>			5		5		5	
Phyllanthaceae	<i>Phyllanthus hirtellus</i>					5	5		
Pittosporaceae	<i>Billardiera scandens</i>		5			5	5		
Poaceae	<i>Anisopogon avenaceus</i>					5			
	<i>Austrostipa pubescens</i>							5	
	<i>Austrostipa</i> spp.						5		
	<i>Entolasia stricta</i>	5	5	5	5	5	5	5	5

Riparian monitoring sites – Spring 2019

Vegetation condition

Family	Species	MRIP01S19	MRIP02S19	MRIP03S19	MRIP04S19	MRIP05S19	MRIP06S19	MRIP07S19	MRIP08S19
	<i>Microlaena stipoides</i>				5				5
	<i>Tetrarrhena juncea</i>					5			
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	3	4	5	5	5	4	5
	<i>Banksia marginata</i>		5	5			5	5	
	<i>Banksia oblongifolia</i>						5		
	<i>Banksia serrata</i>			5		5			
	<i>Grevillea diffusa</i> subsp. <i>diffusa</i>			5					
	<i>Hakea dactyloides</i>	5		5		5	5		
	<i>Hakea salicifolia</i>		5	5	5	5	5	5	5
	<i>Hakea teretifolia</i>	5			5	5	5		5
	<i>Lambertia formosa</i>					5			
	<i>Lomatia myricoides</i>	5		5	5		5	5	3
	<i>Lomatia silaifolia</i>					5			
	<i>Persoonia pinifolia</i>	5	5	5	5	5	5	5	5
	<i>Petrophile pulchella</i>					5			
	<i>Stenocarpus salignus</i>				5			5	5
Restionaceae	<i>Chordifex dimorphus</i>						5		5
	<i>Chordifex fastigiatus</i>	5							
	<i>Empodisma minus</i>		5			5	5		
	<i>Eurychorda complanata</i>	5	5	5					
	<i>Leptocarpus tenax</i>	5			5	5	5		
	<i>Lepyrodia scariosa</i>	5					5		
	<i>Sporadanthus gracilis</i>	5			5	5	5	4	
Rhamnaceae	<i>Pomaderris elliptica</i> subsp. <i>elliptica</i>		5	5				5	
Rubiaceae	<i>Opercularia aspera</i>				5	5	5	5	5
Rutaceae	<i>Leionema dentatum</i>							5	
	<i>Leionema diosmeum</i>	5	5						
	<i>Nematolepis squamea</i> subsp. <i>squamea</i>	5			5		5		
Santalaceae	<i>Leptomeria acida</i>					5			
Sapindaceae	<i>Dodonaea triquetra</i>	5	5	5	5	5	5	5	5
Scrophulariaceae	<i>Gratiola peruviana</i>		5		5				
Smilacaceae	<i>Smilax glyciphylla</i>		5					5	5
Sterculiaceae	<i>Lasiopetalum ferrugineum</i>	5	5		5			5	5
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>					5			5
Xanthorrhoeaceae	<i>Xanthorrhoea media</i>	5				5			
Xyridaceae	<i>Xyris gracilis</i>						5		
	<i>Xyris operculata</i>	5							
	Total	40	45	29	35	52	57	46	33

Condition Scale

- 1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

* Non-native species

▲ RoTAP species

- 2: Geographic range in Australia less than 100 km
 3: Geographic range in Australia more than 100 km
 R: Rare in Australia but does not have an identifiable threat
 C: Reserved in that at least one population is found in a national park or other proclaimed conservation reserve
 a: 1000 plants or more are known to occur within a conservation reserve(s)
 -: reserved population size is not accurately known

Indicator species data – Riparian sites

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP01	<i>Lomatia myricoides</i>	g1	309837.05	6214400.19	5	1
MRIP01	<i>Lomatia myricoides</i>	g2	309837.62	6214399.31	5	1
MRIP01	<i>Lomatia myricoides</i>	g3	309833.83	6214408.03	5	1
MRIP01	<i>Lomatia myricoides</i>	g4	309834.08	6214414.09	5	1
MRIP01	<i>Lomatia myricoides</i>	g5	309833.24	6214421.61	4	1
MRIP01	<i>Lomatia myricoides</i>	g6	309834.45	6214418.39	5	1
MRIP01	<i>Lomatia myricoides</i>	g7	309833.21	6214422.30	5	1
MRIP01	<i>Lomatia myricoides</i>	g8/g201	309835.42	6214423.21	4	1
MRIP01	<i>Lomatia myricoides</i>	g9	309835.66	6214424.22	4	1
MRIP01	<i>Lomatia myricoides</i>	g10	309831.98	6214425.37	5	1
MRIP01	<i>Lomatia myricoides</i>	g11	309834.56	6214437.71	4	1
MRIP01	<i>Lomatia myricoides</i>	g12	309836.93	6214437.47	5	1
MRIP01	<i>Lomatia myricoides</i>	g13	309832.58	6214449.33	5	1
MRIP01	<i>Lomatia myricoides</i>	g14	309848.87	6214503.10	5	1
MRIP01	<i>Lomatia myricoides</i>	g15	309847.80	6214507.66	4	1
MRIP01	<i>Lomatia myricoides</i>	g16	309859.87	6214465.50	1	1
MRIP01	<i>Lomatia myricoides</i>	g17	309865.17	6214385.45	4	1
MRIP01	<i>Lomatia myricoides</i>	g18	309856.19	6214409.62	5	1
MRIP01	<i>Lomatia myricoides</i>	g19	309861.03	6214396.51	4	1
MRIP01	<i>Lomatia myricoides</i>	g20	309854.59	6214392.10	4	1
MRIP01	<i>Prostanthera linearis</i>	h1	309835.83	6214401.73	1	1
MRIP01	<i>Prostanthera linearis</i>	h2	309833.89	6214404.88	1	1
MRIP01	<i>Prostanthera linearis</i>	h3	309833.73	6214406.01	1	1
MRIP01	<i>Prostanthera linearis</i>	h4	309830.52	6214410.46	1	1
MRIP01	<i>Prostanthera linearis</i>	h5	309833.02	6214415.31	5	1
MRIP01	<i>Prostanthera linearis</i>	h6	309834.98	6214437.33	1	1
MRIP01	<i>Prostanthera linearis</i>	h7	309835.48	6214439.12	1	1
MRIP01	<i>Prostanthera linearis</i>	h8	309839.38	6214478.91	1	1
MRIP01	<i>Prostanthera linearis</i>	h9	309852.30	6214437.60	3	1
MRIP01	<i>Prostanthera linearis</i>	h10	309855.42	6214426.52	1	1
MRIP01	<i>Prostanthera linearis</i>	h11	309871.29	6214376.62	1	1
MRIP01	<i>Prostanthera linearis</i>	h12	309857.10	6214409.67	1	1
MRIP01	<i>Prostanthera linearis</i>	h13	309855.70	6214413.75	1	1
MRIP01	<i>Prostanthera linearis</i>	h14	309856.74	6214411.92	1	1
MRIP01	<i>Prostanthera linearis</i>	h15	309857.35	6214405.90	4	1
MRIP01	<i>Prostanthera linearis</i>	h16	309856.26	6214408.28	1	1
MRIP01	<i>Prostanthera linearis</i>	h17	309857.99	6214398.62	1	1
MRIP01	<i>Prostanthera linearis</i>	h18	309859.32	6214400.36	1	1
MRIP01	<i>Prostanthera linearis</i>	h19	309858.06	6214402.33	1	1
MRIP01	<i>Prostanthera linearis</i>	h20	309856.96	6214405.66	5	1
MRIP01	<i>Schoenus melanostachys</i>	i1	309836.48	6214402.00	5	5
MRIP01	<i>Schoenus melanostachys</i>	i2	309833.11	6214412.77	1	1
MRIP01	<i>Schoenus melanostachys</i>	i3/ i202	309835.86	6214421.74	3	5
MRIP01	<i>Schoenus melanostachys</i>	i4	309832.37	6214421.94	3	3
MRIP01	<i>Schoenus melanostachys</i>	i5	309835.65	6214426.47	5	4
MRIP01	<i>Schoenus melanostachys</i>	i6	309835.17	6214428.48	4	4
MRIP01	<i>Schoenus melanostachys</i>	i7	309832.80	6214448.35	4	5

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP01	<i>Schoenus melanostachys</i>	i8	309835.93	6214466.55	3	2
MRIP01	<i>Schoenus melanostachys</i>	i9	309839.58	6214478.86	3	2
MRIP01	<i>Schoenus melanostachys</i>	i10	309836.80	6214485.48	5	5
MRIP01	<i>Schoenus melanostachys</i>	i11	309837.25	6214479.07	2	2
MRIP01	<i>Schoenus melanostachys</i>	i12	309843.97	6214490.82	3	1
MRIP01	<i>Schoenus melanostachys</i>	i13	309845.61	6214505.91	3	4
MRIP01	<i>Schoenus melanostachys</i>	i14	309862.07	6214483.87	3	3
MRIP01	<i>Schoenus melanostachys</i>	i15	309860.10	6214466.75	1	1
MRIP01	<i>Schoenus melanostachys</i>	i16	309859.70	6214464.60	2	2
MRIP01	<i>Schoenus melanostachys</i>	i17	309859.33	6214463.14	1	1
MRIP01	<i>Schoenus melanostachys</i>	i18/i201	309859.74	6214464.24	2	1
MRIP01	<i>Schoenus melanostachys</i>	i19	309851.68	6214448.23	4	4
MRIP01	<i>Schoenus melanostachys</i>	i20	309861.46	6214401.95	3	4
MRIP02	<i>Lomatia myricoides</i>	g21	310017.33	6214640.81	2	1
MRIP02	<i>Lomatia myricoides</i>	g22	310021.92	6214643.97	4	1
MRIP02	<i>Lomatia myricoides</i>	g23	310029.02	6214646.43	1	1
MRIP02	<i>Lomatia myricoides</i>	g24	310038.73	6214649.66	1	1
MRIP02	<i>Lomatia myricoides</i>	g25	310017.62	6214643.23	3	1
MRIP02	<i>Lomatia myricoides</i>	g26	310015.69	6214645.06	5	1
MRIP02	<i>Lomatia myricoides</i>	g27	310047.56	6214654.63	3	1
MRIP02	<i>Lomatia myricoides</i>	g28	310048.71	6214654.16	5	1
MRIP02	<i>Lomatia myricoides</i>	g29	310049.46	6214654.27	1	1
MRIP02	<i>Lomatia myricoides</i>	g30	310052.11	6214656.77	3	1
MRIP02	<i>Lomatia myricoides</i>	g31	310053.74	6214655.79	5	1
MRIP02	<i>Lomatia myricoides</i>	g32	310058.19	6214660.87	5	1
MRIP02	<i>Lomatia myricoides</i>	g33	310063.83	6214660.46	3	1
MRIP02	<i>Lomatia myricoides</i>	g34	310000.94	6214625.13	1	1
MRIP02	<i>Lomatia myricoides</i>	g35	310001.97	6214620.28	3	1
MRIP02	<i>Lomatia myricoides</i>	g36	310003.86	6214626.73	1	1
MRIP02	<i>Lomatia myricoides</i>	g37	310008.64	6214625.29	1	1
MRIP02	<i>Lomatia myricoides</i>	g38	310014.13	6214629.20	1	1
MRIP02	<i>Lomatia myricoides</i>	g39	310020.71	6214622.93	2	1
MRIP02	<i>Lomatia myricoides</i>	g40	310025.36	6214629.70	2	1
MRIP02	<i>Prostanthera linearis</i>	h21	310018.57	6214642.40	1	1
MRIP02	<i>Prostanthera linearis</i>	h22	310023.46	6214645.59	5	1
MRIP02	<i>Prostanthera linearis</i>	h23	310028.14	6214644.77	1	1
MRIP02	<i>Prostanthera linearis</i>	h24	310028.66	6214643.88	1	1
MRIP02	<i>Prostanthera linearis</i>	h25	310032.27	6214644.86	1	1
MRIP02	<i>Prostanthera linearis</i>	h26	310033.36	6214647.67	1	1
MRIP02	<i>Prostanthera linearis</i>	h27	310035.35	6214649.21	1	1
MRIP02	<i>Prostanthera linearis</i>	h28	310036.09	6214649.23	1	1
MRIP02	<i>Prostanthera linearis</i>	h29	310037.13	6214650.01	3	1
MRIP02	<i>Prostanthera linearis</i>	h30	310057.12	6214658.39	1	1
MRIP02	<i>Prostanthera linearis</i>	h31	310038.65	6214650.02	1	1
MRIP02	<i>Prostanthera linearis</i>	h32	310016.54	6214643.40	2	2
MRIP02	<i>Prostanthera linearis</i>	h33	310017.74	6214645.23	1	1
MRIP02	<i>Prostanthera linearis</i>	h34	310041.32	6214652.06	1	1

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP02	<i>Prostanthera linearis</i>	h35	310042.35	6214652.24	1	1
MRIP02	<i>Prostanthera linearis</i>	h36	310046.77	6214654.71	5	1
MRIP02	<i>Prostanthera linearis</i>	h37	310051.44	6214656.51	1	1
MRIP02	<i>Prostanthera linearis</i>	h38	310039.83	6214650.09	4	1
MRIP02	<i>Prostanthera linearis</i>	h39	310058.81	6214659.13	3	5
MRIP02	<i>Prostanthera linearis</i>	h40	310057.77	6214659.11	1	1
MRIP02	<i>Schoenus melanostachys</i>	i21	310023.60	6214643.06	1	1
MRIP02	<i>Schoenus melanostachys</i>	i22	310024.05	6214645.35	1	1
MRIP02	<i>Schoenus melanostachys</i>	i23	310027.04	6214643.88	1	1
MRIP02	<i>Schoenus melanostachys</i>	i24	310030.42	6214645.26	1	1
MRIP02	<i>Schoenus melanostachys</i>	i25	310034.82	6214648.10	1	1
MRIP02	<i>Schoenus melanostachys</i>	i26	310018.01	6214639.72	1	1
MRIP02	<i>Schoenus melanostachys</i>	i27	310016.64	6214644.70	1	1
MRIP02	<i>Schoenus melanostachys</i>	i28	310041.89	6214652.00	4	5
MRIP02	<i>Schoenus melanostachys</i>	i29	310043.11	6214652.56	1	1
MRIP02	<i>Schoenus melanostachys</i>	i30	310052.20	6214654.31	1	1
MRIP02	<i>Schoenus melanostachys</i>	i31	310054.31	6214654.94	1	1
MRIP02	<i>Schoenus melanostachys</i>	i32	310005.79	6214624.20	1	1
MRIP02	<i>Schoenus melanostachys</i>	i33	310005.67	6214623.93	1	1
MRIP02	<i>Schoenus melanostachys</i>	i34	310007.89	6214626.86	1	1
MRIP02	<i>Schoenus melanostachys</i>	i35	310010.04	6214626.39	1	1
MRIP02	<i>Schoenus melanostachys</i>	i36	310014.83	6214626.73	1	1
MRIP02	<i>Schoenus melanostachys</i>	i37	310014.39	6214628.16	1	1
MRIP02	<i>Schoenus melanostachys</i>	i38	310021.72	6214629.48	1	1
MRIP02	<i>Schoenus melanostachys</i>	i39	310024.65	6214630.31	1	1
MRIP02	<i>Schoenus melanostachys</i>	i40	310034.17	6214633.12	5	4
MRIP03	<i>Lomatia myricoides</i>	g101	310514.87	6215342.81	5	1
MRIP03	<i>Lomatia myricoides</i>	g102	310501.18	6215333.12	5	1
MRIP03	<i>Lomatia myricoides</i>	g103	310497.38	6215330.40	5	1
MRIP03	<i>Lomatia myricoides</i>	g104	310483.20	6215320.88	5	1
MRIP03	<i>Lomatia myricoides</i>	g105	310493.94	6215320.73	4	1
MRIP03	<i>Lomatia myricoides</i>	g106	310453.34	6215293.74	5	1
MRIP03	<i>Lomatia myricoides</i>	g107	310452.40	6215292.80	5	1
MRIP03	<i>Lomatia myricoides</i>	g108	310448.73	6215292.57	5	1
MRIP03	<i>Lomatia myricoides</i>	g109	310448.10	6215290.27	5	1
MRIP03	<i>Lomatia myricoides</i>	g110	310450.75	6215289.20	5	1
MRIP03	<i>Lomatia myricoides</i>	g111	310511.17	6215338.40	5	1
MRIP03	<i>Lomatia myricoides</i>	g112	310508.09	6215337.03	5	1
MRIP03	<i>Lomatia myricoides</i>	g113	310490.84	6215324.19	5	1
MRIP03	<i>Lomatia myricoides</i>	g114	310492.02	6215328.78	5	1
MRIP03	<i>Lomatia myricoides</i>	g115	310477.74	6215316.09	5	1
MRIP03	<i>Lomatia myricoides</i>	g116	310458.56	6215302.23	5	1
MRIP03	<i>Lomatia myricoides</i>	g117	310462.08	6215303.66	4	1
MRIP03	<i>Lomatia myricoides</i>	g118	310448.63	6215284.67	5	1
MRIP03	<i>Lomatia myricoides</i>	g119	310445.74	6215285.40	3	1
MRIP03	<i>Lomatia myricoides</i>	g120	310415.57	6215305.10	4	1

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP03	<i>Prostanthera linearis</i>	h101	310504.75	6215334.00	1	1
MRIP03	<i>Prostanthera linearis</i>	h102	310496.20	6215328.43	5	3
MRIP03	<i>Prostanthera linearis</i>	h103	310496.53	6215327.78	1	1
MRIP03	<i>Prostanthera linearis</i>	h104	310496.37	6215327.49	1	1
MRIP03	<i>Prostanthera linearis</i>	h105	310494.72	6215325.03	1	1
MRIP03	<i>Prostanthera linearis</i>	h106	310492.91	6215321.99	1	1
MRIP03	<i>Prostanthera linearis</i>	h107/h203	310490.88	6215324.01	1	1
MRIP03	<i>Prostanthera linearis</i>	h108	310474.30	6215322.91	1	1
MRIP03	<i>Prostanthera linearis</i>	h109	310459.63	6215297.08	1	1
MRIP03	<i>Prostanthera linearis</i>	h110	310457.72	6215296.59	4	1
MRIP03	<i>Prostanthera linearis</i>	h111	310457.38	6215296.27	5	2
MRIP03	<i>Prostanthera linearis</i>	h112	310452.49	6215290.79	1	1
MRIP03	<i>Prostanthera linearis</i>	h113	310418.06	6215303.87	1	1
MRIP03	<i>Prostanthera linearis</i>	h114	310425.33	6215313.07	1	1
MRIP03	<i>Prostanthera linearis</i>	h115	310433.64	6215311.76	5	1
MRIP03	<i>Prostanthera linearis</i>	h116	310437.45	6215313.88	1	1
MRIP03	<i>Prostanthera linearis</i>	h117	310436.89	6215313.54	1	1
MRIP03	<i>Prostanthera linearis</i>	h118	310445.64	6215316.86	5	1
MRIP03	<i>Prostanthera linearis</i>	h119	310448.29	6215318.67	5	1
MRIP03	<i>Prostanthera linearis</i>	h120	310448.94	6215317.09	3	1
MRIP03	<i>Schoenus melanostachys</i>	i121	310520.35	6215342.50	2	1
MRIP03	<i>Schoenus melanostachys</i>	i122/i204	310509.34	6215337.58	3	1
MRIP03	<i>Schoenus melanostachys</i>	i123	310501.99	6215335.06	1	2
MRIP03	<i>Schoenus melanostachys</i>	i124	310501.79	6215331.97	1	1
MRIP03	<i>Schoenus melanostachys</i>	i125	310495.51	6215331.40	1	1
MRIP03	<i>Schoenus melanostachys</i>	i126/i205	310486.08	6215322.63	4	4
MRIP03	<i>Schoenus melanostachys</i>	i127	310485.46	6215319.97	2	1
MRIP03	<i>Schoenus melanostachys</i>	i128	310479.33	6215316.91	4	4
MRIP03	<i>Schoenus melanostachys</i>	i129	310475.94	6215315.09	2	1
MRIP03	<i>Schoenus melanostachys</i>	i130	310460.21	6215298.50	4	4
MRIP03	<i>Schoenus melanostachys</i>	i131	310459.11	6215297.78	1	1
MRIP03	<i>Schoenus melanostachys</i>	i132/i206	310455.42	6215294.93	2	2
MRIP03	<i>Schoenus melanostachys</i>	i133/i207	310445.00	6215282.00	2	1
MRIP03	<i>Schoenus melanostachys</i>	i134	310440.62	6215285.05	5	5
MRIP03	<i>Schoenus melanostachys</i>	i135	310409.10	6215302.50	2	3
MRIP03	<i>Schoenus melanostachys</i>	i136	310424.44	6215312.50	1	1
MRIP03	<i>Schoenus melanostachys</i>	i137	310427.48	6215311.81	2	1
MRIP03	<i>Schoenus melanostachys</i>	i138	310441.21	6215288.02	3	5
MRIP03	<i>Schoenus melanostachys</i>	i139	310447.44	6215280.99	3	3
MRIP03	<i>Schoenus melanostachys</i>	i140	310497.55	6215323.12	3	1
MRIP04	<i>Lomatia myricoides</i>	g121	311009.17	6215481.13	1	1
MRIP04	<i>Lomatia myricoides</i>	g122	311006.53	6215475.78	4	1
MRIP04	<i>Lomatia myricoides</i>	g123	311062.49	6215496.47	5	1
MRIP04	<i>Lomatia myricoides</i>	g124	311060.59	6215493.29	5	1
MRIP04	<i>Lomatia myricoides</i>	g125	311068.13	6215499.66	5	1
MRIP04	<i>Lomatia myricoides</i>	g126	311070.42	6215498.34	5	1
MRIP04	<i>Lomatia myricoides</i>	g127	311071.93	6215504.89	4	1

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP04	<i>Lomatia myricoides</i>	g128	311075.17	6215506.75	4	1
MRIP04	<i>Lomatia myricoides</i>	g129	311073.20	6215498.96	5	1
MRIP04	<i>Lomatia myricoides</i>	g130	311073.72	6215498.61	5	1
MRIP04	<i>Lomatia myricoides</i>	g131	311076.14	6215500.68	5	1
MRIP04	<i>Lomatia myricoides</i>	g132	311075.85	6215501.94	4	1
MRIP04	<i>Lomatia myricoides</i>	g133	311077.16	6215502.92	5	1
MRIP04	<i>Lomatia myricoides</i>	g134	311073.60	6215503.85	5	1
MRIP04	<i>Lomatia myricoides</i>	g135	311084.99	6215504.97	4	1
MRIP04	<i>Lomatia myricoides</i>	g136	311089.89	6215505.30	4	1
MRIP04	<i>Lomatia myricoides</i>	g137	311064.71	6215516.30	4	1
MRIP04	<i>Lomatia myricoides</i>	g138	311074.25	6215520.67	4	1
MRIP04	<i>Lomatia myricoides</i>	g139	311068.53	6215519.91	4	1
MRIP04	<i>Lomatia myricoides</i>	g140	311082.29	6215517.28	5	1
MRIP04	<i>Prostanthera linearis</i>	h121	311020.93	6215482.89	1	1
MRIP04	<i>Prostanthera linearis</i>	h122	311030.16	6215476.69	3	1
MRIP04	<i>Prostanthera linearis</i>	h123	311041.99	6215486.94	1	1
MRIP04	<i>Prostanthera linearis</i>	h124	311049.86	6215488.02	4	3
MRIP04	<i>Prostanthera linearis</i>	h125	311049.72	6215483.21	1	1
MRIP04	<i>Prostanthera linearis</i>	h126	311053.16	6215487.44	1	1
MRIP04	<i>Prostanthera linearis</i>	h127	311054.22	6215488.99	1	1
MRIP04	<i>Prostanthera linearis</i>	h128	311053.91	6215487.27	1	1
MRIP04	<i>Prostanthera linearis</i>	h129	311062.90	6215489.38	1	1
MRIP04	<i>Prostanthera linearis</i>	h130	311060.13	6215491.91	5	1
MRIP04	<i>Prostanthera linearis</i>	h131	311063.06	6215492.35	1	1
MRIP04	<i>Prostanthera linearis</i>	h132	311063.71	6215495.15	1	1
MRIP04	<i>Prostanthera linearis</i>	h133	311060.45	6215497.58	1	1
MRIP04	<i>Prostanthera linearis</i>	h134	311067.72	6215492.01	1	1
MRIP04	<i>Prostanthera linearis</i>	h135	311077.80	6215498.34	1	1
MRIP04	<i>Prostanthera linearis</i>	h136	311077.89	6215499.63	4	1
MRIP04	<i>Prostanthera linearis</i>	h137	311080.63	6215501.37	1	1
MRIP04	<i>Prostanthera linearis</i>	h138/h192	311080.13	6215500.54	1	1
MRIP04	<i>Prostanthera linearis</i>	h139	311069.72	6215520.17	1	1
MRIP04	<i>Prostanthera linearis</i>	h140	311066.37	6215518.28	1	1
MRIP04	<i>Schoenus melanostachys</i>	i101	311008.30	6215470.76	3	3
MRIP04	<i>Schoenus melanostachys</i>	i102	311006.16	6215479.08	3	3
MRIP04	<i>Schoenus melanostachys</i>	i103	311042.12	6215488.07	4	2
MRIP04	<i>Schoenus melanostachys</i>	i104	311051.84	6215486.33	4	4
MRIP04	<i>Schoenus melanostachys</i>	i105	311063.11	6215496.46	5	3
MRIP04	<i>Schoenus melanostachys</i>	i106	311068.60	6215500.54	5	5
MRIP04	<i>Schoenus melanostachys</i>	i107	311070.51	6215501.81	5	5
MRIP04	<i>Schoenus melanostachys</i>	i108	311076.05	6215504.98	5	5
MRIP04	<i>Schoenus melanostachys</i>	i109	311074.72	6215508.03	5	4
MRIP04	<i>Schoenus melanostachys</i>	i110	311083.67	6215504.78	4	4
MRIP04	<i>Schoenus melanostachys</i>	i111	311087.18	6215503.52	4	4
MRIP04	<i>Schoenus melanostachys</i>	i112	311074.35	6215521.23	3	2
MRIP04	<i>Schoenus melanostachys</i>	i113	311054.08	6215513.12	5	4
MRIP04	<i>Schoenus melanostachys</i>	i114	311018.85	6215509.38	3	3

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Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP04	<i>Schoenus melanostachys</i>	i115	311063.43	6215518.08	3	1
MRIP04	<i>Schoenus melanostachys</i>	i116	311024.12	6215511.47	3	2
MRIP04	<i>Schoenus melanostachys</i>	i117	311023.34	6215510.88	4	1
MRIP04	<i>Schoenus melanostachys</i>	i118	311019.97	6215511.47	5	4
MRIP04	<i>Schoenus melanostachys</i>	i119	311019.72	6215493.75	4	4
MRIP04	<i>Schoenus melanostachys</i>	i120	311017.06	6215508.65	3	3
MRIP05	<i>Lomatia myricoides</i>	g61	311462.67	6213713.33	5	1
MRIP05	<i>Lomatia myricoides</i>	g62	311462.19	6213709.16	1	1
MRIP05	<i>Lomatia myricoides</i>	g63	311460.42	6213720.26	1	1
MRIP05	<i>Lomatia myricoides</i>	g64	311460.96	6213722.25	4	1
MRIP05	<i>Lomatia myricoides</i>	g65	311464.70	6213721.90	4	1
MRIP05	<i>Lomatia myricoides</i>	g66	311461.49	6213725.56	1	1
MRIP05	<i>Lomatia myricoides</i>	g67	311495.51	6213780.20	4	1
MRIP05	<i>Lomatia myricoides</i>	g68/ g205	311526.37	6213808.77	1	1
MRIP05	<i>Lomatia myricoides</i>	g69/g204	311526.12	6213809.95	5	1
MRIP05	<i>Lomatia myricoides</i>	g70	311524.26	6213811.72	1	1
MRIP05	<i>Lomatia myricoides</i>	g71	311524.60	6213811.33	1	1
MRIP05	<i>Lomatia myricoides</i>	g72	311524.20	6213818.07	4	1
MRIP05	<i>Lomatia myricoides</i>	g73	311523.63	6213818.38	4	1
MRIP05	<i>Lomatia myricoides</i>	g74	311520.64	6213814.59	4	1
MRIP05	<i>Lomatia myricoides</i>	g75	311519.78	6213812.96	4	1
MRIP05	<i>Lomatia myricoides</i>	g76	311502.57	6213794.07	3	1
MRIP05	<i>Lomatia myricoides</i>	g77	311500.90	6213793.99	1	1
MRIP05	<i>Lomatia myricoides</i>	g78	311494.86	6213785.28	5	1
MRIP05	<i>Lomatia myricoides</i>	g79	311521.25	6213820.94	5	1
MRIP05	<i>Lomatia myricoides</i>	g80	311529.32	6213815.57	4	1
MRIP05	<i>Prostanthera linearis</i>	h61	311462.89	6213722.39	1	1
MRIP05	<i>Prostanthera linearis</i>	h62/h202	311463.82	6213723.92	1	1
MRIP05	<i>Prostanthera linearis</i>	h63	311462.07	6213722.06	1	1
MRIP05	<i>Prostanthera linearis</i>	h64	311464.61	6213726.57	1	1
MRIP05	<i>Prostanthera linearis</i>	h65	311465.24	6213726.49	1	1
MRIP05	<i>Prostanthera linearis</i>	h66	311465.61	6213729.74	1	1
MRIP05	<i>Prostanthera linearis</i>	h67	311466.97	6213731.80	1	1
MRIP05	<i>Prostanthera linearis</i>	h68	311469.31	6213733.21	4	1
MRIP05	<i>Prostanthera linearis</i>	h69	311471.02	6213733.77	4	1
MRIP05	<i>Prostanthera linearis</i>	h70	311473.82	6213744.67	1	1
MRIP05	<i>Prostanthera linearis</i>	h71	311479.54	6213759.90	1	1
MRIP05	<i>Prostanthera linearis</i>	h72	311486.40	6213769.73	3	1
MRIP05	<i>Prostanthera linearis</i>	h73	311485.87	6213771.97	1	1
MRIP05	<i>Prostanthera linearis</i>	h74	311490.80	6213774.20	5	1
MRIP05	<i>Prostanthera linearis</i>	h75	311494.11	6213776.26	1	1
MRIP05	<i>Prostanthera linearis</i>	h76	311503.44	6213776.72	1	1
MRIP05	<i>Prostanthera linearis</i>	h77	311503.00	6213784.91	1	1
MRIP05	<i>Prostanthera linearis</i>	h78	311510.51	6213790.11	5	1
MRIP05	<i>Prostanthera linearis</i>	h79	311524.97	6213805.82	3	1
MRIP05	<i>Prostanthera linearis</i>	h80	311525.62	6213807.69	1	1

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Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP05	<i>Schoenus melanostachys</i>	i61	311465.40	6213721.59	1	1
MRIP05	<i>Schoenus melanostachys</i>	i62	311463.37	6213727.12	4	1
MRIP05	<i>Schoenus melanostachys</i>	i63	311467.68	6213733.43	4	1
MRIP05	<i>Schoenus melanostachys</i>	i64	311474.04	6213737.50	4	1
MRIP05	<i>Schoenus melanostachys</i>	i65	311474.82	6213738.59	4	1
MRIP05	<i>Schoenus melanostachys</i>	i66	311474.08	6213744.63	4	1
MRIP05	<i>Schoenus melanostachys</i>	i67	311473.14	6213742.00	1	1
MRIP05	<i>Schoenus melanostachys</i>	i68	311480.08	6213760.04	4	1
MRIP05	<i>Schoenus melanostachys</i>	i69	311483.58	6213758.74	1	1
MRIP05	<i>Schoenus melanostachys</i>	i70	311481.03	6213761.76	3	1
MRIP05	<i>Schoenus melanostachys</i>	i71	311488.44	6213767.98	3	1
MRIP05	<i>Schoenus melanostachys</i>	i72	311488.29	6213769.51	3	1
MRIP05	<i>Schoenus melanostachys</i>	i73	311498.73	6213781.09	1	1
MRIP05	<i>Schoenus melanostachys</i>	i74	311503.12	6213780.74	4	1
MRIP05	<i>Schoenus melanostachys</i>	i75	311503.41	6213785.15	2	1
MRIP05	<i>Schoenus melanostachys</i>	i76	311505.67	6213784.05	2	1
MRIP05	<i>Schoenus melanostachys</i>	i77	311506.01	6213786.56	3	1
MRIP05	<i>Schoenus melanostachys</i>	i78	311513.03	6213791.94	3	1
MRIP05	<i>Schoenus melanostachys</i>	i79	311523.25	6213817.64	1	1
MRIP05	<i>Schoenus melanostachys</i>	i80	311523.83	6213819.00	2	1
MRIP06	<i>Lomatia myricoides</i>	g81	311571.09	6213885.94	5	1
MRIP06	<i>Lomatia myricoides</i>	g82/g253	311572.45	6213887.90	5	1
MRIP06	<i>Lomatia myricoides</i>	g83	311572.68	6213888.32	5	1
MRIP06	<i>Lomatia myricoides</i>	g84	311573.77	6213894.66	4	1
MRIP06	<i>Lomatia myricoides</i>	g85	311580.35	6213896.08	4	1
MRIP06	<i>Lomatia myricoides</i>	g86	311576.62	6213893.67	4	1
MRIP06	<i>Lomatia myricoides</i>	g87	311569.17	6213877.91	5	1
MRIP06	<i>Lomatia myricoides</i>	g88	311586.74	6213896.08	4	1
MRIP06	<i>Lomatia myricoides</i>	g89	311585.86	6213899.64	4	1
MRIP06	<i>Lomatia myricoides</i>	g90	311588.16	6213900.74	4	1
MRIP06	<i>Lomatia myricoides</i>	g91	311590.42	6213909.49	4	1
MRIP06	<i>Lomatia myricoides</i>	g92	311592.83	6213923.13	5	1
MRIP06	<i>Lomatia myricoides</i>	g93/g254	311599.11	6213931.93	3	1
MRIP06	<i>Lomatia myricoides</i>	g94	311602.59	6213935.17	1	1
MRIP06	<i>Lomatia myricoides</i>	g95	311603.16	6213934.66	4	1
MRIP06	<i>Lomatia myricoides</i>	g96	311605.35	6213936.02	3	1
MRIP06	<i>Lomatia myricoides</i>	g97	311599.64	6213940.48	5	1
MRIP06	<i>Lomatia myricoides</i>	g98	311609.01	6213949.69	3	1
MRIP06	<i>Lomatia myricoides</i>	g99	311596.36	6213932.90	4	1
MRIP06	<i>Lomatia myricoides</i>	g100	311611.83	6213971.72	4	1
MRIP06	<i>Prostanthera linearis</i>	h81	311569.10	6213886.04	4	1
MRIP06	<i>Prostanthera linearis</i>	h82/h204	311570.42	6213887.42	1	1
MRIP06	<i>Prostanthera linearis</i>	h83	311571.44	6213890.12	1	1
MRIP06	<i>Prostanthera linearis</i>	h84/h205	311572.98	6213893.89	1	1
MRIP06	<i>Prostanthera linearis</i>	h85	311575.57	6213895.86	1	1
MRIP06	<i>Prostanthera linearis</i>	h86	311575.40	6213898.04	1	1
MRIP06	<i>Prostanthera linearis</i>	h87	311581.66	6213898.01	1	1

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Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP06	<i>Prostanthera linearis</i>	h88	311579.48	6213900.32	5	1
MRIP06	<i>Prostanthera linearis</i>	h89	311583.44	6213903.68	3	1
MRIP06	<i>Prostanthera linearis</i>	h90	311578.81	6213875.86	1	1
MRIP06	<i>Prostanthera linearis</i>	h91	311595.65	6213895.17	1	1
MRIP06	<i>Prostanthera linearis</i>	h92	311588.52	6213902.08	3	1
MRIP06	<i>Prostanthera linearis</i>	h93	311591.18	6213906.49	1	1
MRIP06	<i>Prostanthera linearis</i>	h94	311591.38	6213911.33	1	1
MRIP06	<i>Prostanthera linearis</i>	h95/h206	311592.61	6213911.87	1	1
MRIP06	<i>Prostanthera linearis</i>	h96/h207	311592.93	6213912.72	1	1
MRIP06	<i>Prostanthera linearis</i>	h97/h208	311597.52	6213921.43	1	1
MRIP06	<i>Prostanthera linearis</i>	h98	311597.11	6213922.78	1	1
MRIP06	<i>Prostanthera linearis</i>	h99/h209	311601.36	6213934.28	4	1
MRIP06	<i>Prostanthera linearis</i>	h100	311601.82	6213930.93	1	1
MRIP06	<i>Schoenus melanostachys</i>	i81	311569.91	6213889.70	4	1
MRIP06	<i>Schoenus melanostachys</i>	i82	311568.20	6213889.95	3	1
MRIP06	<i>Schoenus melanostachys</i>	i83	311571.93	6213893.12	3	1
MRIP06	<i>Schoenus melanostachys</i>	i84	311581.75	6213898.45	5	1
MRIP06	<i>Schoenus melanostachys</i>	i85	311582.53	6213902.10	4	1
MRIP06	<i>Schoenus melanostachys</i>	i86	311576.65	6213893.05	3	1
MRIP06	<i>Schoenus melanostachys</i>	i87	311571.37	6213873.78	2	1
MRIP06	<i>Schoenus melanostachys</i>	i88	311587.31	6213900.33	2	1
MRIP06	<i>Schoenus melanostachys</i>	i89/i209	311588.00	6213902.00	3	1
MRIP06	<i>Schoenus melanostachys</i>	i90	311586.31	6213904.15	3	1
MRIP06	<i>Schoenus melanostachys</i>	i91	311590.24	6213906.60	4	1
MRIP06	<i>Schoenus melanostachys</i>	i210	311595.74	6213919.86	3	1
MRIP06	<i>Schoenus melanostachys</i>	i93	311595.97	6213924.95	3	1
MRIP06	<i>Schoenus melanostachys</i>	i94	311599.82	6213925.85	3	1
MRIP06	<i>Schoenus melanostachys</i>	i251	311603.85	6213923.76	3	1
MRIP06	<i>Schoenus melanostachys</i>	i96	311604.89	6213937.52	4	1
MRIP06	<i>Schoenus melanostachys</i>	i97/i252	311600.73	6213938.54	4	1
MRIP06	<i>Schoenus melanostachys</i>	i98	311596.17	6213934.90	2	1
MRIP06	<i>Schoenus melanostachys</i>	i99	311595.05	6213932.76	4	1
MRIP06	<i>Schoenus melanostachys</i>	i100	311600.13	6213940.30	3	1
MRIP07	<i>Lomatia myricoides</i>	g161	312157.03	6215252.97	1	1
MRIP07	<i>Lomatia myricoides</i>	g162	312156.25	6215254.65	5	1
MRIP07	<i>Lomatia myricoides</i>	g163	312158.94	6215257.64	5	1
MRIP07	<i>Lomatia myricoides</i>	g164	312153.70	6215262.63	5	1
MRIP07	<i>Lomatia myricoides</i>	g165	312156.94	6215269.27	3	1
MRIP07	<i>Lomatia myricoides</i>	g166	312160.16	6215274.28	4	1
MRIP07	<i>Lomatia myricoides</i>	g167	312160.18	6215277.56	4	1
MRIP07	<i>Lomatia myricoides</i>	g168	312159.92	6215282.65	4	1
MRIP07	<i>Lomatia myricoides</i>	g169	312157.76	6215287.82	1	1
MRIP07	<i>Lomatia myricoides</i>	g170/g208	312159.82	6215297.59	4	1
MRIP07	<i>Lomatia myricoides</i>	g171	312159.97	6215304.48	5	1
MRIP07	<i>Lomatia myricoides</i>	g172	312159.82	6215313.03	4	1
MRIP07	<i>Lomatia myricoides</i>	g173	312150.07	6215266.88	5	1
MRIP07	<i>Lomatia myricoides</i>	g174	312144.99	6215267.78	3	1

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Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP07	<i>Lomatia myricoides</i>	g175	312150.36	6215272.46	2	1
MRIP07	<i>Lomatia myricoides</i>	g176	312149.95	6215274.61	5	1
MRIP07	<i>Lomatia myricoides</i>	g177	312146.49	6215276.77	4	1
MRIP07	<i>Lomatia myricoides</i>	g178	312151.46	6215280.33	3	1
MRIP07	<i>Lomatia myricoides</i>	g179	312148.90	6215292.09	3	1
MRIP07	<i>Lomatia myricoides</i>	g180	312152.78	6215311.31	3	1
MRIP07	<i>Prostanthera linearis</i>	h161	312164.01	6215325.03	4	2
MRIP07	<i>Prostanthera linearis</i>	h162	312165.16	6215325.37	5	3
MRIP07	<i>Prostanthera linearis</i>	h163	312150.05	6215266.75	1	1
MRIP07	<i>Prostanthera linearis</i>	h164	312148.87	6215285.11	4	1
MRIP07	<i>Prostanthera linearis</i>	h165	312149.54	6215287.48	5	1
MRIP07	<i>Prostanthera linearis</i>	h166	312150.42	6215285.00	4	1
MRIP07	<i>Prostanthera linearis</i>	h167	312150.76	6215301.54	1	1
MRIP07	<i>Prostanthera linearis</i>	h168	312152.83	6215309.40	1	1
MRIP07	<i>Prostanthera linearis</i>	h169	312152.79	6215310.49	5	1
MRIP07	<i>Prostanthera linearis</i>	h170	312154.61	6215308.46	5	1
MRIP07	<i>Prostanthera linearis</i>	h171/h193	312152.77	6215309.50	4	1
MRIP07	<i>Prostanthera linearis</i>	h172	312150.23	6215312.30	3	1
MRIP07	<i>Prostanthera linearis</i>	h173/h194	312151.62	6215310.88	1	1
MRIP07	<i>Prostanthera linearis</i>	h174	312153.51	6215310.52	5	1
MRIP07	<i>Prostanthera linearis</i>	h175	312152.85	6215314.22	4	1
MRIP07	<i>Prostanthera linearis</i>	h176	312154.76	6215314.00	3	1
MRIP07	<i>Prostanthera linearis</i>	h177/h195	312153.48	6215312.38	3	1
MRIP07	<i>Prostanthera linearis</i>	h178	312153.16	6215316.44	1	1
MRIP07	<i>Prostanthera linearis</i>	h179	312154.66	6215322.06	1	1
MRIP07	<i>Prostanthera linearis</i>	h180	312148.57	6215331.48	5	1
MRIP07	<i>Schoenus melanostachys</i>	i161	312159.61	6215259.47	2	1
MRIP07	<i>Schoenus melanostachys</i>	i162	312156.76	6215268.16	3	1
MRIP07	<i>Schoenus melanostachys</i>	i163	312161.30	6215270.97	1	1
MRIP07	<i>Schoenus melanostachys</i>	i164	312160.63	6215274.19	2	1
MRIP07	<i>Schoenus melanostachys</i>	i165	312157.33	6215278.10	3	1
MRIP07	<i>Schoenus melanostachys</i>	i166	312156.92	6215287.95	4	1
MRIP07	<i>Schoenus melanostachys</i>	i167	312159.36	6215292.64	1	1
MRIP07	<i>Schoenus melanostachys</i>	i168	312164.60	6215309.12	3	1
MRIP07	<i>Schoenus melanostachys</i>	i169	312166.03	6215313.11	2	4
MRIP07	<i>Schoenus melanostachys</i>	i170	312150.30	6215269.97	4	1
MRIP07	<i>Schoenus melanostachys</i>	i171	312150.63	6215266.52	2	1
MRIP07	<i>Schoenus melanostachys</i>	i172	312144.34	6215267.51	3	3
MRIP07	<i>Schoenus melanostachys</i>	i173	312145.63	6215256.76	1	1
MRIP07	<i>Schoenus melanostachys</i>	i174	312151.01	6215276.25	3	1
MRIP07	<i>Schoenus melanostachys</i>	i175	312148.93	6215287.39	5	1
MRIP07	<i>Schoenus melanostachys</i>	i176	312147.84	6215295.25	3	3
MRIP07	<i>Schoenus melanostachys</i>	i177	312146.17	6215298.07	5	1
MRIP07	<i>Schoenus melanostachys</i>	i178	312149.54	6215297.70	3	1
MRIP07	<i>Schoenus melanostachys</i>	i179	312150.48	6215302.79	4	1
MRIP07	<i>Schoenus melanostachys</i>	i180	312153.05	6215309.58	3	4

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP08	<i>Lomatia myricoides</i>	g181	312167.00	6215486.96	4	1
MRIP08	<i>Lomatia myricoides</i>	g182/g209	312166.19	6215490.00	4	1
MRIP08	<i>Lomatia myricoides</i>	g183	312163.61	6215490.88	3	1
MRIP08	<i>Lomatia myricoides</i>	g184	312162.85	6215494.49	1	1
MRIP08	<i>Lomatia myricoides</i>	g185	312166.08	6215498.35	4	1
MRIP08	<i>Lomatia myricoides</i>	g186	312157.40	6215492.79	4	1
MRIP08	<i>Lomatia myricoides</i>	g187	312156.48	6215492.78	2	1
MRIP08	<i>Lomatia myricoides</i>	g188/g210	312158.21	6215496.84	3	1
MRIP08	<i>Lomatia myricoides</i>	g189	312156.43	6215496.97	3	1
MRIP08	<i>Lomatia myricoides</i>	g190	312158.36	6215498.37	4	1
MRIP08	<i>Lomatia myricoides</i>	g191	312157.92	6215501.42	4	1
MRIP08	<i>Lomatia myricoides</i>	g192	312159.94	6215502.37	4	1
MRIP08	<i>Lomatia myricoides</i>	g193/g251	312155.80	6215504.32	4	1
MRIP08	<i>Lomatia myricoides</i>	g194	312153.34	6215502.02	3	1
MRIP08	<i>Lomatia myricoides</i>	g195	312152.84	6215501.41	4	1
MRIP08	<i>Lomatia myricoides</i>	g196	312152.07	6215504.52	4	1
MRIP08	<i>Lomatia myricoides</i>	g197/g252	312152.98	6215506.22	3	1
MRIP08	<i>Lomatia myricoides</i>	g198	312152.86	6215510.83	4	1
MRIP08	<i>Lomatia myricoides</i>	g199	312155.06	6215513.72	5	1
MRIP08	<i>Lomatia myricoides</i>	g200	312154.85	6215515.81	5	1
MRIP08	<i>Prostanthera linearis</i>	h181	312179.02	6215457.71	4	1
MRIP08	<i>Prostanthera linearis</i>	h182	312179.39	6215459.68	1	1
MRIP08	<i>Prostanthera linearis</i>	h183	312168.89	6215506.53	4	3
MRIP08	<i>Prostanthera linearis</i>	h184/h196	312154.07	6215492.16	1	1
MRIP08	<i>Prostanthera linearis</i>	h185	312149.34	6215499.87	4	1
MRIP08	<i>Prostanthera linearis</i>	h186	312150.07	6215498.51	4	3
MRIP08	<i>Prostanthera linearis</i>	h187	312146.17	6215532.19	1	1
MRIP08	<i>Prostanthera linearis</i>	h188	312158.91	6215548.28	1	1
MRIP08	<i>Prostanthera linearis</i>	h189	312163.39	6215555.89	5	1
MRIP08	<i>Prostanthera linearis</i>	h190	312177.63	6215573.32	1	1
MRIP08	<i>Schoenus melanostachys</i>	i181	312163.55	6215490.29	1	1
MRIP08	<i>Schoenus melanostachys</i>	i182	312165.00	6215499.22	3	1
MRIP08	<i>Schoenus melanostachys</i>	i183	312159.28	6215498.84	1	1
MRIP08	<i>Schoenus melanostachys</i>	i184	312153.13	6215527.03	1	1
MRIP08	<i>Schoenus melanostachys</i>	i185	312152.04	6215528.26	3	1
MRIP08	<i>Schoenus melanostachys</i>	i186	312151.98	6215531.69	3	1
MRIP08	<i>Schoenus melanostachys</i>	i187	312151.60	6215532.84	4	1
MRIP08	<i>Schoenus melanostachys</i>	i188	312151.39	6215534.11	5	4
MRIP08	<i>Schoenus melanostachys</i>	i189	312150.46	6215536.12	2	1
MRIP08	<i>Schoenus melanostachys</i>	i190	312148.53	6215536.56	2	1
MRIP08	<i>Schoenus melanostachys</i>	i191	312148.64	6215536.74	1	1
MRIP08	<i>Schoenus melanostachys</i>	i192	312147.77	6215538.52	2	1
MRIP08	<i>Schoenus melanostachys</i>	i193	312150.85	6215544.73	5	2
MRIP08	<i>Schoenus melanostachys</i>	i194	312147.86	6215546.04	3	1
MRIP08	<i>Schoenus melanostachys</i>	i195	312148.26	6215551.16	4	1
MRIP08	<i>Schoenus melanostachys</i>	i196	312172.89	6215491.21	2	1
MRIP08	<i>Schoenus melanostachys</i>	i197	312172.32	6215502.96	3	1

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP08	<i>Schoenus melanostachys</i>	i198	312169.93	6215505.14	4	3
MRIP08	<i>Schoenus melanostachys</i>	i199	312170.30	6215506.92	3	1
MRIP08	<i>Schoenus melanostachys</i>	i200	312167.79	6215509.63	4	2
MRIP09	<i>Lomatia myricoides</i>	g41/g202	311423.68	6213567.45	5	1
MRIP09	<i>Lomatia myricoides</i>	g42/g203	311422.77	6213566.64	5	1
MRIP09	<i>Lomatia myricoides</i>	g43	311438.01	6213610.51	4	1
MRIP09	<i>Lomatia myricoides</i>	g44	311432.92	6213615.63	5	1
MRIP09	<i>Lomatia myricoides</i>	g45	311427.31	6213615.46	1	1
MRIP09	<i>Lomatia myricoides</i>	g46	311421.42	6213626.47	4	1
MRIP09	<i>Lomatia myricoides</i>	g47	311426.95	6213628.22	5	1
MRIP09	<i>Lomatia myricoides</i>	g48	311430.07	6213629.71	5	1
MRIP09	<i>Lomatia myricoides</i>	g49	311427.97	6213628.32	5	1
MRIP09	<i>Lomatia myricoides</i>	g50	311441.57	6213647.06	4	1
MRIP09	<i>Lomatia myricoides</i>	g51	311444.36	6213651.94	2	1
MRIP09	<i>Lomatia myricoides</i>	g52	311441.40	6213645.19	4	1
MRIP09	<i>Lomatia myricoides</i>	g53	311437.91	6213663.08	4	1
MRIP09	<i>Lomatia myricoides</i>	g54	311438.22	6213669.28	3	1
MRIP09	<i>Lomatia myricoides</i>	g55	311447.06	6213686.06	5	1
MRIP09	<i>Lomatia myricoides</i>	g56	311434.98	6213655.95	4	1
MRIP09	<i>Lomatia myricoides</i>	g57	311439.97	6213651.18	4	1
MRIP09	<i>Lomatia myricoides</i>	g58	311450.06	6213654.36	5	1
MRIP09	<i>Lomatia myricoides</i>	g59	311451.16	6213658.85	3	1
MRIP09	<i>Lomatia myricoides</i>	g60	311433.81	6213642.43	5	1
MRIP09	<i>Prostanthera linearis</i>	h41	311424.49	6213567.14	4	1
MRIP09	<i>Prostanthera linearis</i>	h42	311423.95	6213574.22	1	1
MRIP09	<i>Prostanthera linearis</i>	h43	311426.13	6213572.82	3	1
MRIP09	<i>Prostanthera linearis</i>	h44	311427.19	6213571.69	4	1
MRIP09	<i>Prostanthera linearis</i>	h45	311440.62	6213592.46	1	1
MRIP09	<i>Prostanthera linearis</i>	h46	311441.82	6213604.54	4	1
MRIP09	<i>Prostanthera linearis</i>	h47	311438.61	6213610.84	4	1
MRIP09	<i>Prostanthera linearis</i>	h48	311436.79	6213613.74	3	1
MRIP09	<i>Prostanthera linearis</i>	h49	311435.01	6213615.47	3	1
MRIP09	<i>Prostanthera linearis</i>	h50	311432.83	6213626.87	3	1
MRIP09	<i>Prostanthera linearis</i>	h51/h201	311431.15	6213629.20	1	1
MRIP09	<i>Prostanthera linearis</i>	h52	311430.28	6213629.74	3	1
MRIP09	<i>Prostanthera linearis</i>	h53	311428.16	6213629.63	1	1
MRIP09	<i>Prostanthera linearis</i>	h54	311432.64	6213631.15	1	1
MRIP09	<i>Prostanthera linearis</i>	h55	311432.15	6213637.11	4	1
MRIP09	<i>Prostanthera linearis</i>	h56	311446.54	6213651.86	1	1
MRIP09	<i>Prostanthera linearis</i>	h57	311446.24	6213652.32	1	1
MRIP09	<i>Prostanthera linearis</i>	h58	311442.51	6213647.59	3	1
MRIP09	<i>Prostanthera linearis</i>	h59	311438.84	6213665.94	5	1
MRIP09	<i>Prostanthera linearis</i>	h60	311438.12	6213669.43	1	1
MRIP09	<i>Schoenus melanostachys</i>	i41	311424.94	6213571.37	4	1
MRIP09	<i>Schoenus melanostachys</i>	i42	311424.10	6213574.74	4	1
MRIP09	<i>Schoenus melanostachys</i>	i43	311430.49	6213580.51	3	1

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP09	<i>Schoenus melanostachys</i>	i44	311432.28	6213580.27	2	1
MRIP09	<i>Schoenus melanostachys</i>	i45	311432.70	6213587.80	5	1
MRIP09	<i>Schoenus melanostachys</i>	i46	311437.12	6213595.98	4	1
MRIP09	<i>Schoenus melanostachys</i>	i47	311439.32	6213598.00	4	1
MRIP09	<i>Schoenus melanostachys</i>	i48	311440.79	6213603.98	4	1
MRIP09	<i>Schoenus melanostachys</i>	i49	311438.28	6213612.23	2	1
MRIP09	<i>Schoenus melanostachys</i>	i50	311428.96	6213614.90	1	1
MRIP09	<i>Schoenus melanostachys</i>	i51	311427.71	6213618.42	4	1
MRIP09	<i>Schoenus melanostachys</i>	i52	311430.75	6213628.60	4	1
MRIP09	<i>Schoenus melanostachys</i>	i53	311432.80	6213627.64	3	1
MRIP09	<i>Schoenus melanostachys</i>	i54	311432.82	6213630.80	3	1
MRIP09	<i>Schoenus melanostachys</i>	i55	311445.79	6213652.95	2	1
MRIP09	<i>Schoenus melanostachys</i>	i56	311441.47	6213678.65	4	1
MRIP09	<i>Schoenus melanostachys</i>	i57	311442.36	6213683.92	4	1
MRIP09	<i>Schoenus melanostachys</i>	i58	311444.67	6213654.76	1	1
MRIP09	<i>Schoenus melanostachys</i>	i59	311448.83	6213658.22	4	1
MRIP09	<i>Schoenus melanostachys</i>	i60	311422.48	6213646.12	3	1
MRIP10	<i>Lomatia myricoides</i>	g141	311145.93	6215581.65	5	1
MRIP10	<i>Lomatia myricoides</i>	g142	311138.53	6215591.28	5	1
MRIP10	<i>Lomatia myricoides</i>	g143	311136.08	6215601.18	5	1
MRIP10	<i>Lomatia myricoides</i>	g144	311134.45	6215603.96	5	1
MRIP10	<i>Lomatia myricoides</i>	g145	311129.75	6215610.34	5	1
MRIP10	<i>Lomatia myricoides</i>	g146	311128.79	6215613.61	3	1
MRIP10	<i>Lomatia myricoides</i>	g147	311121.36	6215626.16	4	1
MRIP10	<i>Lomatia myricoides</i>	g148	311117.61	6215631.09	5	1
MRIP10	<i>Lomatia myricoides</i>	g149	311100.59	6215637.36	5	1
MRIP10	<i>Lomatia myricoides</i>	g150	311098.18	6215646.19	5	1
MRIP10	<i>Lomatia myricoides</i>	g151/g206	311097.47	6215652.44	4	1
MRIP10	<i>Lomatia myricoides</i>	g152	311111.00	6215661.00	5	1
MRIP10	<i>Lomatia myricoides</i>	g153	311124.00	6215643.00	1	1
MRIP10	<i>Lomatia myricoides</i>	g154	311120.00	6215651.00	4	1
MRIP10	<i>Lomatia myricoides</i>	g155	311131.00	6215647.00	4	1
MRIP10	<i>Lomatia myricoides</i>	g156	311129.00	6215639.00	5	1
MRIP10	<i>Lomatia myricoides</i>	g157	311130.00	6215639.00	5	1
MRIP10	<i>Lomatia myricoides</i>	g158	311129.00	6215635.00	5	1
MRIP10	<i>Lomatia myricoides</i>	g159	311141.00	6215629.00	5	1
MRIP10	<i>Lomatia myricoides</i>	g160	311146.00	6215622.00	5	1
MRIP10	<i>Prostanthera linearis</i>	h141	311151.15	6215567.38	1	1
MRIP10	<i>Prostanthera linearis</i>	h142	311147.66	6215565.51	1	1
MRIP10	<i>Prostanthera linearis</i>	h143	311149.40	6215572.19	5	1
MRIP10	<i>Prostanthera linearis</i>	h144	311146.25	6215574.29	1	1
MRIP10	<i>Prostanthera linearis</i>	h145	311135.96	6215591.55	1	1
MRIP10	<i>Prostanthera linearis</i>	h146	311134.85	6215587.90	5	1
MRIP10	<i>Prostanthera linearis</i>	h147	311123.30	6215616.34	1	1
MRIP10	<i>Prostanthera linearis</i>	h148	311114.93	6215630.12	1	1
MRIP10	<i>Prostanthera linearis</i>	h149	311102.96	6215636.98	1	1
MRIP10	<i>Prostanthera linearis</i>	h150	311128.00	6215649.00	1	1

Riparian monitoring sites – Spring 2019

Condition and Reproductive Rating for Riparian Indicator Species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
MRIP10	<i>Prostanthera linearis</i>	h151	311133.00	6215651.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h152	311133.00	6215646.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h153	311128.00	6215638.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h154	311132.00	6215635.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h155	311139.00	6215629.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h156	311134.00	6215624.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h157	311145.00	6215623.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h158	311143.00	6215620.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h159	311126.00	6215618.00	1	1
MRIP10	<i>Prostanthera linearis</i>	h160	311125.00	6215608.00	1	1
MRIP10	<i>Schoenus melanostachys</i>	i141/i203	311153.01	6215565.92	3	3
MRIP10	<i>Schoenus melanostachys</i>	i142	311136.15	6215601.71	3	2
MRIP10	<i>Schoenus melanostachys</i>	i143	311135.33	6215603.34	3	1
MRIP10	<i>Schoenus melanostachys</i>	i144	311132.73	6215609.57	4	4
MRIP10	<i>Schoenus melanostachys</i>	i145	311134.98	6215587.70	2	1
MRIP10	<i>Schoenus melanostachys</i>	i146	311129.79	6215612.52	1	1
MRIP10	<i>Schoenus melanostachys</i>	i147	311117.12	6215630.11	3	3
MRIP10	<i>Schoenus melanostachys</i>	i148	311116.61	6215630.60	3	4
MRIP10	<i>Schoenus melanostachys</i>	i149	311105.74	6215650.40	4	4
MRIP10	<i>Schoenus melanostachys</i>	i150	311093.09	6215653.73	4	3
MRIP10	<i>Schoenus melanostachys</i>	i151	311099.20	6215673.72	4	5
MRIP10	<i>Schoenus melanostachys</i>	i152	311115.34	6215670.38	3	2
MRIP10	<i>Schoenus melanostachys</i>	i153	311120.00	6215652.00	5	5
MRIP10	<i>Schoenus melanostachys</i>	i154	311133.00	6215636.00	4	4
MRIP10	<i>Schoenus melanostachys</i>	i155	311132.00	6215632.00	5	5
MRIP10	<i>Schoenus melanostachys</i>	i156	311136.00	6215626.00	5	5
MRIP10	<i>Schoenus melanostachys</i>	i157	311151.00	6215552.00	4	4
MRIP10	<i>Schoenus melanostachys</i>	i158	311157.00	6215552.00	1	1
MRIP10	<i>Schoenus melanostachys</i>	i159	311159.00	6215551.00	2	1
MRIP10	<i>Schoenus melanostachys</i>	i160	311168.00	6215559.00	4	3

NB: Shaded rows indicate dead individuals

Condition Scale

1 = severe damage/dieback
 2 = many dead stems
 3 = some dead branches
 4 = minor damage
 5 = healthy

Reproductive Status:

1 = nil
 2 = sparse (occasional flowers only)
 3 = low (under 25 percent of potential)
 4 = moderate (25 to 75 percent of potential)
 5 = high (over 75 percent of potential flowering)

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