



Metropolitan Coal Upland Swamp Vegetation Monitoring

Longwalls 301-303 – 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 has been prepared as a component of the Longwalls 301-303 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.

In accordance with the Metropolitan Coal Longwalls 301-303 Biodiversity Management Plan (BMP) (Metropolitan Coal, 2018), a monitoring program has been implemented to monitor the potential impacts of Longwalls 301-303 on upland swamp vegetation¹. Mining of Longwall 301 commenced on 28 June 2017. This spring 2019 report presents the fifth dataset collected since the mining of Longwalls 301-303 commenced, with data also collected in spring 2017, autumn 2018, spring 2018 and autumn 2019 (Eco Logical Australia 2018b – 2020). Prior to the commencement of mining, baseline data was collected in spring 2015, autumn 2016, spring 2016 and autumn 2017 (Eco Logical Australia 2018a).

¹ No additional riparian vegetation monitoring sites have been established for Longwalls 301-303. Riparian areas along Waratah Rivulet and the Eastern Tributary will continue to be monitored at sites MRIP01 to MRIP12 and reported in Longwalls 20-22 and/or Longwalls 23-27 vegetation monitoring reports.

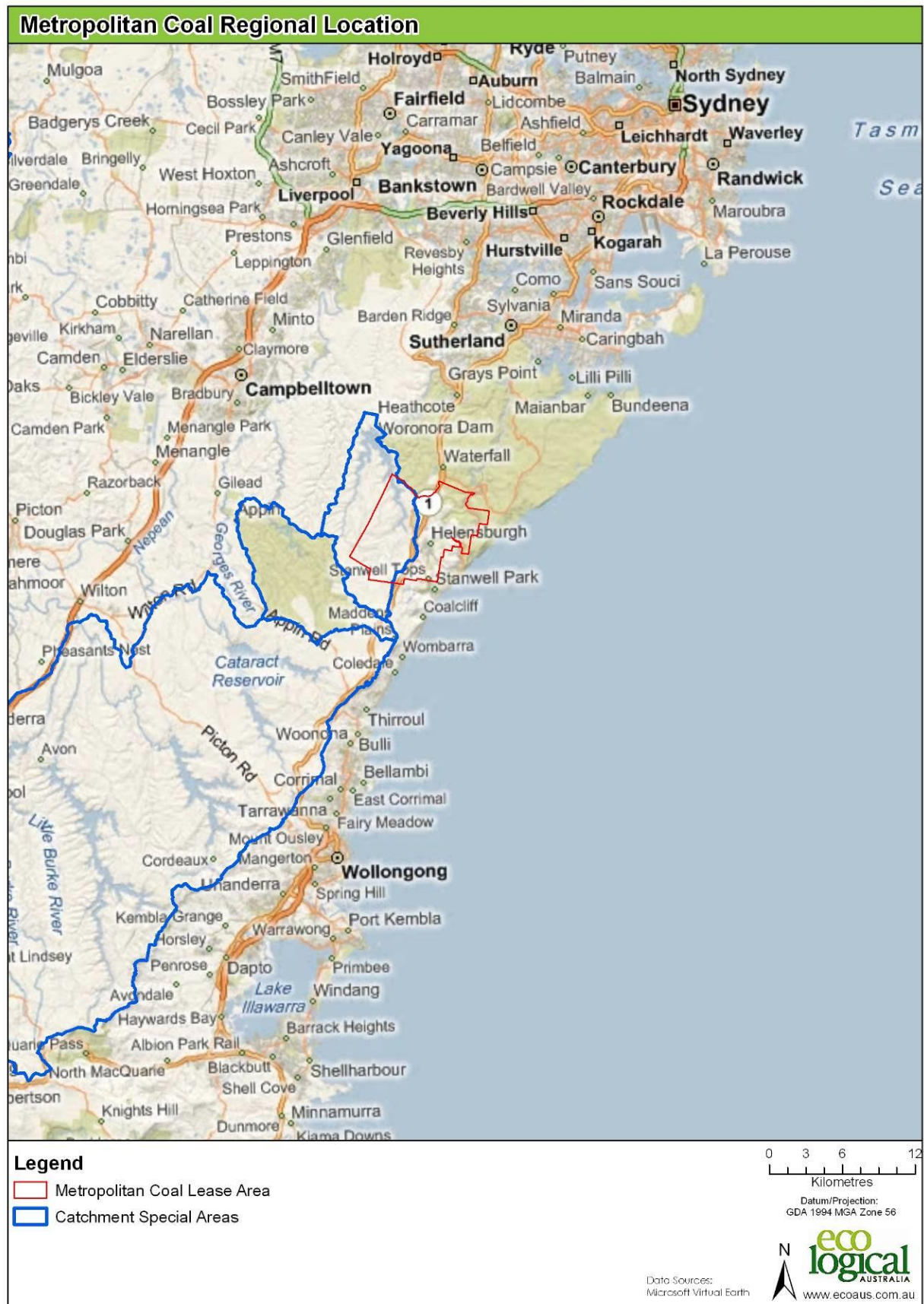


Figure 1: Metropolitan Coal regional location.

2 Upland Swamp Vegetation Mapping

A baseline flora survey of the Metropolitan Coal longwall mining area was undertaken by Bangalay Botanical Surveys (BBS 2008) for the Metropolitan Coal Project Environmental Assessment (Helensburgh Coal Pty Ltd, 2008). This baseline flora survey identified and mapped vegetation communities for a large area of the Metropolitan Coal lease boundary including the area overlying Longwalls 301-303 and surrounds (**Figure 2**). The identification of vegetation communities in the baseline flora survey (Bangalay Botanical Surveys 2008) largely followed the vegetation mapping of the Woronora, O'Hares and Metropolitan Catchments by NSW National Parks and Wildlife Services (NPWS 2003).

A number of distinct vegetation communities have been identified as comprising the Upland Swamps Complex within the Woronora, O'Hares and Metropolitan Catchments (NPWS 2003), with four distinct upland swamp vegetation communities identified by Bangalay Botanical Surveys (2008) namely:

- Tea Tree Thicket;
- Banksia Thicket;
- Sedgeland–heath Complex (an amalgamation of the Sedgeland, Restioid Heath and Cyperoid Heath vegetation associations identified by Keith & Myerscough (1993) consistent with NPWS (2003)); and
- Fringing Eucalypt Woodland.

The vegetation community mapping for upland swamps within 600 m of the Longwalls 301-303 secondary extraction was validated and updated by Eco Logical Australia (2016). The updated vegetation mapping (Eco Logical Australia 2016) confirmed the presence of 18 upland swamps within 600 m of Longwalls 301-303 and 14 upland swamps within the 35° angle of draw and/or predicted 20 mm subsidence contour. All of the upland swamps were identified as valley side swamps (**Figure 3**). All upland swamps within 600 m of Longwalls 301-303 secondary extraction were identified as supporting the Banksia Thicket vegetation community, with the exception of Swamp 58 (**Figure 3**), which was identified as supporting both Banksia Thicket and Sedgeland-heath Complex.

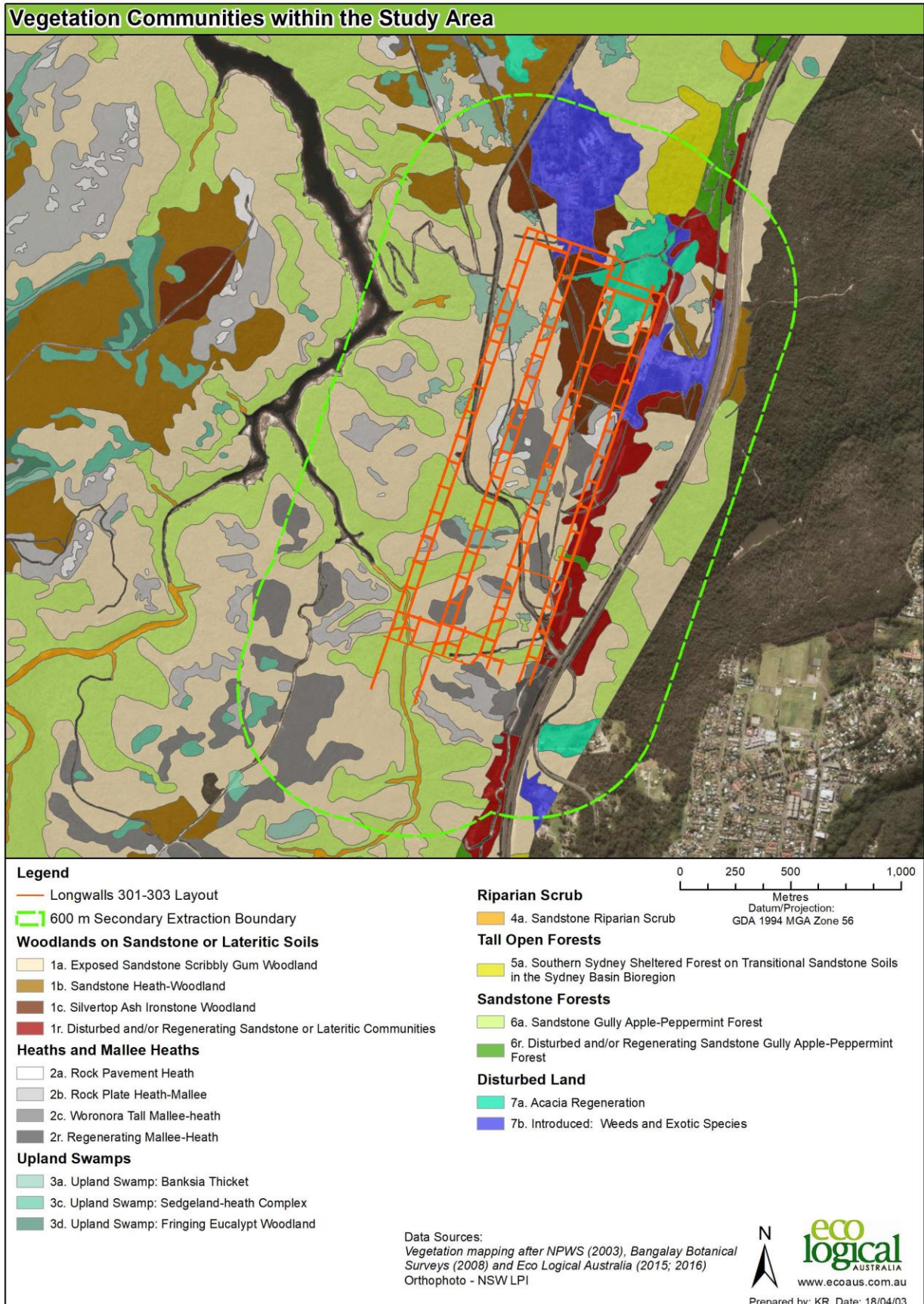


Figure 2: Vegetation communities overlying Longwalls 301-303 and surrounds.

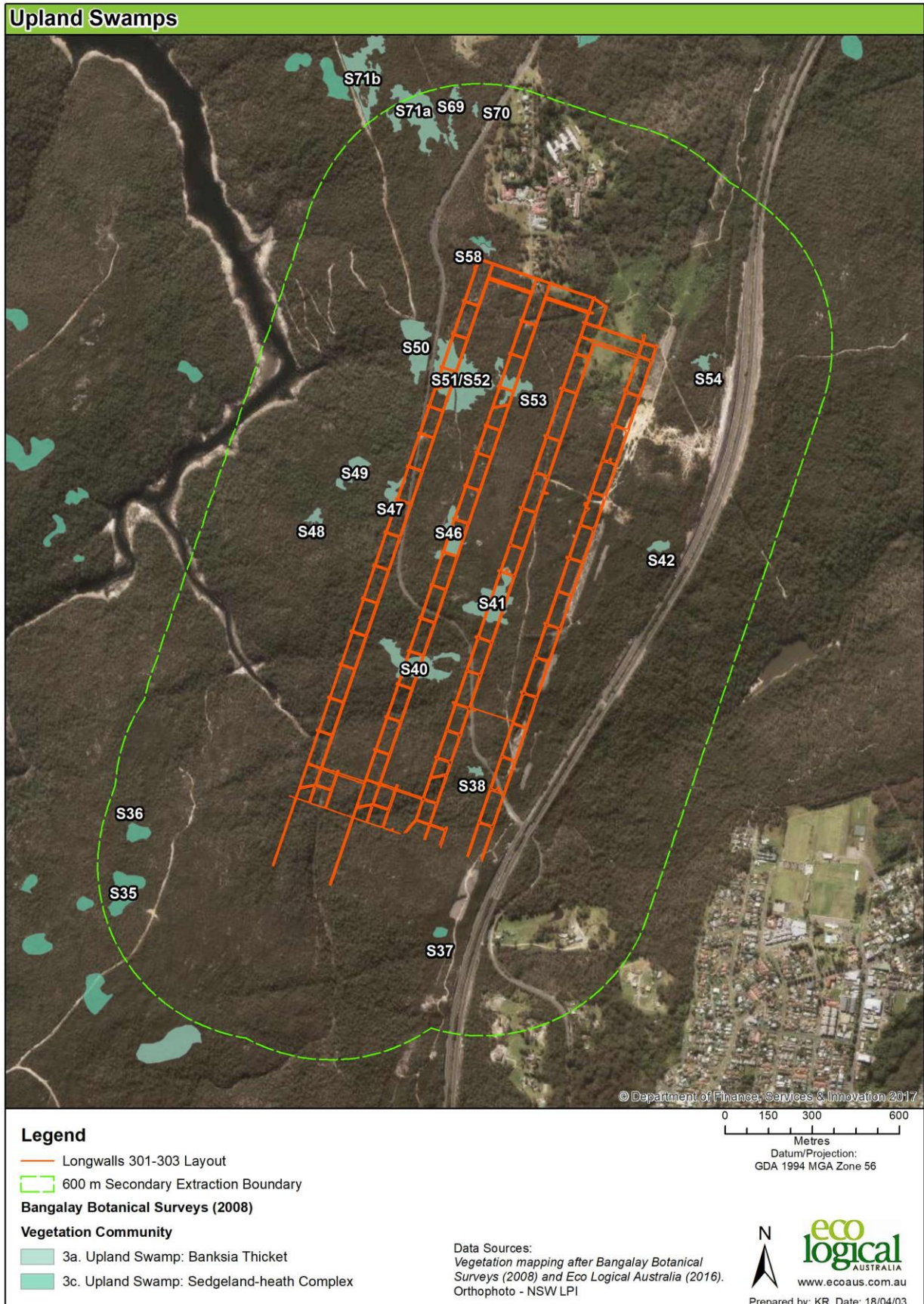


Figure 3: Upland swamps overlying and adjacent to Longwalls 301-303.

3 Methods

3.1 Visual inspections

Visual inspections were conducted in spring 2019 for Swamps 38, 40, 41, 46, 47, 48, 49, 50, 51/52, 53 and 58² and in control Swamps 101, 111a, 125, 135, 136, 137a, 137b and 138 (**Figure 3** and **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).

Many of the Longwalls 301-303 upland swamps comprise dense Banksia Thicket, which makes traverses difficult to impractical at some locations. It is noted that portions of Swamp 46 and Swamp 51/52 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey.

Photographs of any cracking, erosion, water colour changes and stressed vegetation are taken, concurrently with a description of the nature and extent of the observations, and appropriate global positioning system (GPS) readings. Where changes in vegetation condition are observed in a longwall swamp which were not similar to changes observed in control swamp(s), the extent of change will be noted, and mapped where practicable. Seepage is documented by photographs of flow over exposed surfaces, e.g. terminal step.

² This includes all swamps within the Longwalls 301-303 35° angle of draw and/or predicted 20 mm subsidence contour, with the exception of Swamp 42 and Swamp 54 which are predicted to experience minimal subsidence movements (MSEC, 2016).

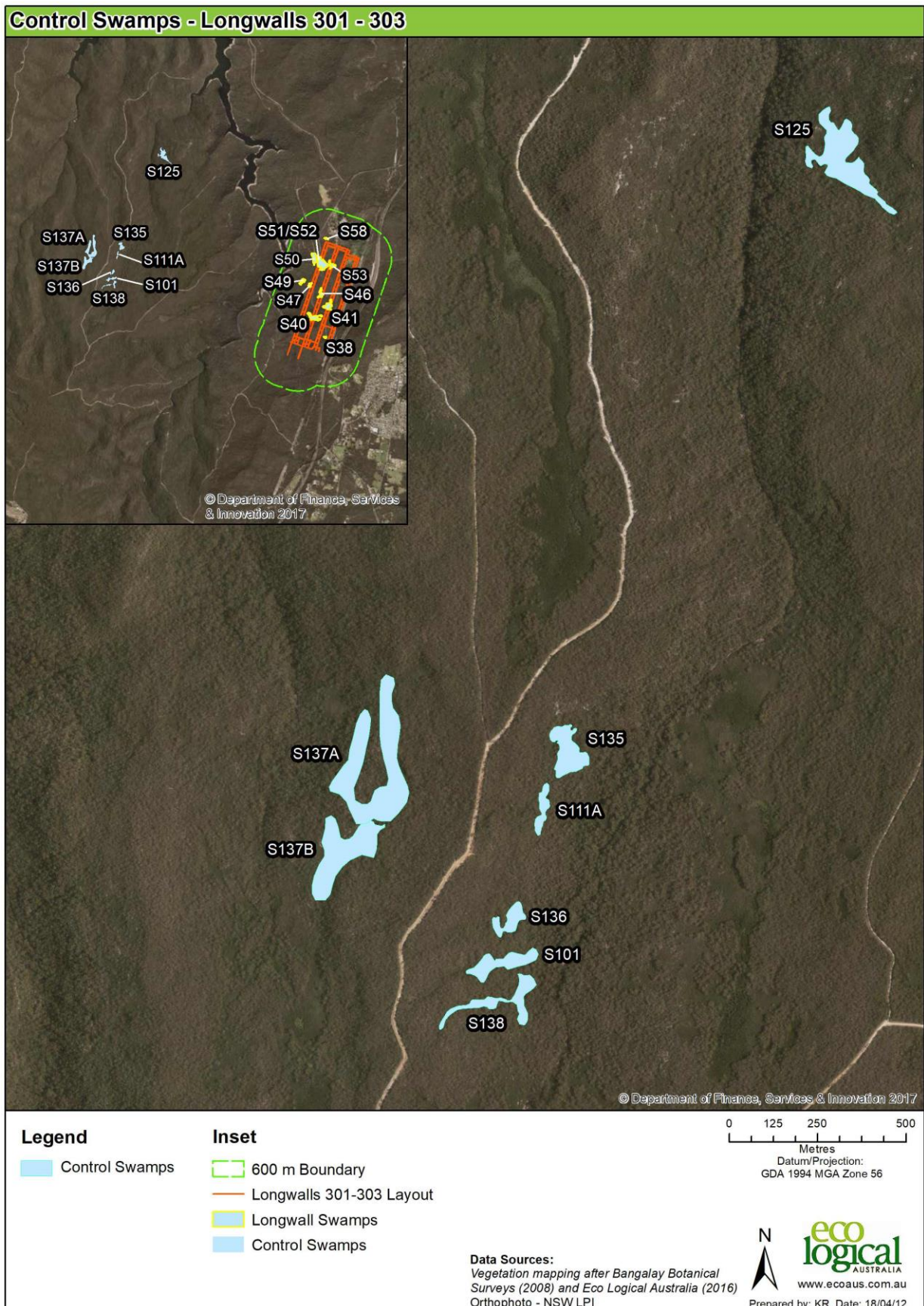


Figure 4: Control swamps in which vegetation monitoring is undertaken.

3.2 Transect/Quadrat Monitoring

Transect and quadrat monitoring was conducted in spring 2019 at Swamps 40, 41, 46, 51/52 and 53 over Longwalls 301-303. These swamps tend to have their longest axis running horizontally along the contour and perpendicular to the gradient and are often rather narrow. Each swamp was monitored along three transects running downslope and perpendicular to the horizontal long axis with transects approximately evenly distributed along the long axis.

The line of each transect has been marked at regular intervals (flagging tape every 5 m, metal stakes every 20 m) to ensure that the same line is used each time. Vegetation assessments were made on 1 m² quadrats placed immediately adjacent to the transect line with one quadrat edge located on the line (southern side of transect line for Swamps 40, 46, 51/52 and 53 and eastern side for Swamp 41) every 5 m starting from 0 m. The transect length varies for each swamp, however the statistical analyses performed on the quadrat data do not require the transect lengths to be the same between swamps.

The data collected for each quadrat includes:

- 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.

Control Swamps 101, 135, 136, 137a and 137b, were selected for comparison with the swamps over Longwalls 301-303 and the same transect/quadrat monitoring methodology was used to survey each of these swamps in spring 2019.

Subsequent to the autumn 2017 baseline survey and prior to the spring 2017 survey, Swamp 46 and Swamp 51/52 were subject to WaterNSW hazard reduction burns, resulting in vegetation along transects in these swamps no longer being comparable to the control swamps.

3.3 Indicator Species Monitoring

Consistent with the Longwalls 20-22 and Longwalls 23-27 upland swamp vegetation monitoring programs, indicator species monitoring was conducted for a selection of upland swamps with the swamps selected for the monitoring based on the presence of the indicator species. As for the Longwalls 20-22 and Longwalls 23-27 upland swamp vegetation monitoring programs, indicator species for monitoring were *Epacris obtusifolia*, *Sprengelia incarnata* and *Pultenaea aristata*. However, insufficient individuals of *Pultenaea aristata* were available for monitoring in the swamps over Longwalls 301-303. Twenty tagged individuals of *Epacris obtusifolia* and *Sprengelia incarnata* were monitored as follows:

- *Epacris obtusifolia* monitored in each of Swamps 40, 51/52 and 53 (longwall swamps) and control Swamps 101, 136 and 137a; and
- *Sprengelia incarnata* monitored in each of Swamps 40, 51/52 and 53 (longwall swamps) and control Swamps 101, 136 and 137b.

Subsequent to the autumn 2017 baseline survey and prior to the spring 2017 survey, Swamp 51/52 was subject to WaterNSW hazard reduction burns, resulting in the death of indicator species in Swamp 51/52. As a result, indicator species monitoring in Swamp 51/52 has been removed from the monitoring program.

Population monitoring data collected included:

- 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.

Copies of data sheets used for upland swamp monitoring surveys are provided in **Appendix A**.

All upland swamp site details, including GPS waypoints, are provided in **Appendix B**.

3.4 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).

3.5 Survey timing

Consistent with Longwalls 301-303 BMP, vegetation monitoring is conducted bi-annually in spring and autumn. A summary of the survey timing of vegetation monitoring in spring 2019 is outlined in **Table 1**.

Table 1: Survey timing for spring 2019.

Date	Upland Swamp Sites
02/09/2019	Swamp 40 & 48
03/09/2019	Swamp 138
04/09/2019	Swamp 135, Swamp 111a
11/09/2019	Swamp 41 & 38
20/09/2019	Swamp 51/52 (in part)
30/09/2019	Swamp 136
01/10/2019	Swamp 101
08/10/2019	Swamp 50 & Swamp 51/52 (in part)
10/10/2019	Swamp 46
16/10/2019	Swamp 125
17/10/2019	Swamp 53
18/10/2019	Swamp 47, 49 & 58
21/10/2019	Swamp 137a (in part)
22/10/2019	Swamp 137b, Swamp 137a (in part)

3.6 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 autumn 2016 (8.0°C – 29.2°C) and the previous spring 2018 (6.7°C – 36.3°C).

The monthly rainfall from January 2015 to December 2019, encompassing the entire study period (October 2015 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 5**.

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 2018a – 2020)³, and is summarised in the table below (**Table 2**).

Table 2: Summary of weather conditions throughout monitoring period (Spring 2015 – Spring 2019).

Survey Season / Period	Conditions prior to survey/s	Rainfall during survey/s
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)

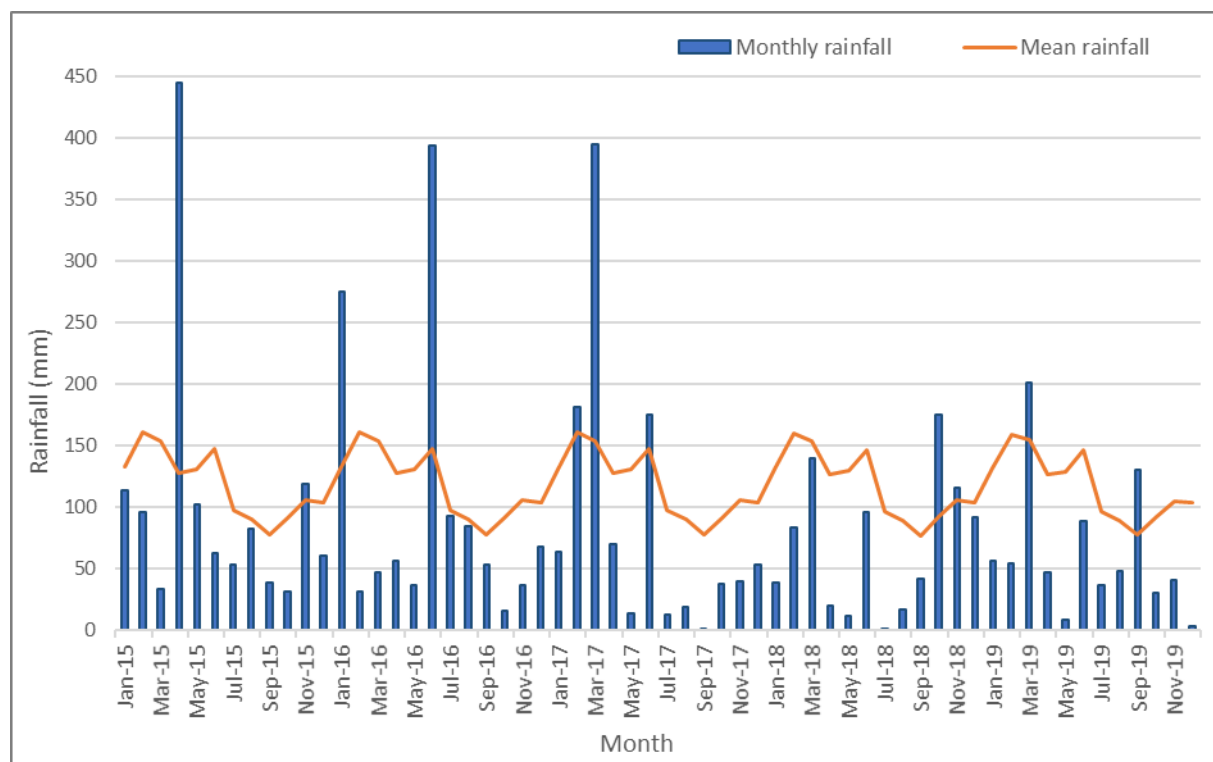
³ Previous reporting has based mean rainfall data on Bureau of Meteorology Station No. 068228 (Bellambi). Reports since autumn 2017 have used Darkes Forest Station No. 068024 which has a longer rainfall record for comparison of long term means.

Table 3: Monthly rainfall for survey period (January 2015 to Dec 2019) taken from Metropolitan Colliery Meteorological Station Helensburgh 2.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	181.5	395.0	70.0	13.5	173.0	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 No. 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 5: Monthly rainfall for the study area (January 2015 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 068024 (Darkes Forest) established in 1894 (Source: www.bom.gov.au, Jan 2020).

3.7 Assessment against performance indicators

The monitoring results from the spring 2019 survey have been analysed and assessed against the performance indicator developed for upland swamp vegetation monitoring in accordance with the Longwalls 301-303 Biodiversity Management Plan (**Appendix C**).

Visual observations

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

Transect/quadrat monitoring

The data collected from the transect/quadrat monitoring is 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.

Consistent with the Longwalls 301-303 BMP, these analyses are not applicable to data collected from Swamp 46 and Swamp 51/52 following the hazard reduction burns conducted by WaterNSW prior to the spring 2017 survey. Data from these swamps have previously been included in the analysis for the baseline period (spring 2015 to autumn 2017) and for the spring 2017 report, however have been removed from all monitoring seasons since the autumn 2018 report. Data for Swamps 46 and 51/52 has since been reported separately in the Longwalls 301-303 vegetation monitoring reports (**Section 4**).

Indicator species monitoring

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

Assessment against upland swamp vegetation performance indicator

The visual observation data, transect/quadrat data, and the population monitoring of indicator species will be used to inform the assessment of vegetation changes in the swamps over time against the upland swamps vegetation performance indicator:

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

4 Results & discussion

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

4.1 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 sediment was observed in either longwall or control swamps, other than where minor cracks in exposed bedrock occur (weathering artefact and fire damage in Swamp 137b). Shrinking of swamp surface sediments was not observed in autumn 2019.
- Areas in which active erosion was observed were minor and limited to sheet/surface wash (Swamps 40, 48, 51/52, 111a and 137a).
- 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 higher September rainfall was evident in the seepage recorded across many of the longwall sites: abundant at Swamp 51/52; moderate across Swamps 40 and 53; and minor at Swamps 46, 49 and 50. Minor seepage was recorded at only one of the control sites (Swamp 135) in spring 2019.
- Most of the dieback present in both longwall and control swamps in spring 2019 was observed in previous seasons. Vegetation at both longwall and control sites in the current season was found to be generally in good condition with no unusual areas of vegetation senescence observed, however some isolated dieback and senescence of individual plants occurred throughout most longwall and control swamps. Exceptions to the generally good condition of vegetation within upland swamps in spring 2019 include the following observations:
 - Individuals of *Banksia ericifolia* subsp. *ericifolia* observed with yellowing foliage and dieback were common and widespread throughout Swamps 137a.
 - Species with commonly observed individuals with yellowing foliage and dieback were only recorded at control sites:
 - *Banksia ericifolia* subsp. *ericifolia* (at isolated points of Swamp 135);
 - *Hakea teretifolia* (scattered throughout Swamps 101 and 138, and at isolated points of Swamps 135 and 137b);
 - *Hakea gibbosa* (at isolated points of Swamp 111a); and
 - *Leptospermum squarrosum* (at isolated points of Swamp 137a).
 - Species with occasional individuals observed with yellowing foliage and dieback were recorded at only one longwall site (Swamp 53) and a number of control sites:
 - *Banksia ericifolia* subsp. *ericifolia* (scattered throughout Swamps 53 and 137a, and at isolated points across Swamp 137b);
 - *Hakea teretifolia* (widespread throughout Swamp 111a, scattered throughout Swamp 53, and at isolated points of Swamp 137a);
 - *Leptospermum squarrosum* (at isolated points of Swamp 137b);

- *Petrophile pulchella* (scattered throughout Swamps 111a, and at isolated points across Swamp 125); and
- *Pteridium esculentum* (at isolated points within Swamp 47).
- Species observed with just a few individuals with yellowing foliage and dieback included:
 - *Banksia ericifolia* subsp. *ericifolia* (widespread throughout Swamp 101, scattered throughout Swamp 41 and 136 and at isolated points across Swamp 40, 46, 47, 48 and 51/52); and
 - *Hakea teretifolia* (scattered throughout Swamp 136, and at isolated points across Swamp 48 and 53).
- Standing litter in the ground layer was observed across both longwall and control sites with the following species noted as having yellowing and senescent culms: *Empodisma minus*, *Chordifex fastigiatus*, *Lepidosperma filiformis* (commonly observed around the rock platforms of Swamps 51/52 and 53, in particular), *Lepyrodia scariosa* and *Schoenus brevifolius*.
- As a result of the hazard reduction burns conducted by WaterNSW in 2017, the vegetation in parts of Swamp 46 and Swamp 51/52 is distinctly different to all other monitoring swamps. These fires were patchy and did not burn the entire area of either swamp. Where the fire did burn the vegetation, there is no remaining live mid-layer vegetation, whilst there are abundant standing dead stems (**Plate 1**). The ground layer consists of a relatively sparse (typically <5% cover) and low (0 – 10cm) layer of both mid storey and ground layer seedlings, which have germinated in the time since the burns. In spring 2019 it was noted that the dead shrubs were beginning to fall over.
- No weed species were observed within any of the control or longwall swamps in spring 2019.



Plate 1: Standing dead shrub stems and ground layer regeneration in Swamp 51/52 following 2017 hazard reduction burns, spring 2019.

4.2 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 **Appendix E**.

The vegetation structure, dominant species and estimated cover for each stratum has been variable across the baseline monitoring period and the five monitoring seasons since the commencement of longwall mining (spring 2017 – spring 2019), with variations recorded between sites, seasons and strata. This variability is considered to reflect both the natural variations in the height and cover/abundance of vegetation structural layers through time, as well as the subjective nature of data collection.

The vegetation structure commonly found within all longwalls swamps is slightly different to that of the controls, most likely attributable to fire history. The mid layer is taller and denser compared with the mid layer at control sites. Similar to control swamps, the canopy is dominated by *Banksia ericifolia* subsp. *ericifolia*, *Hakea teretifolia* and *Leptospermum squarrosum*, but the cover is generally greater in longwall sites, which usually have a less diverse ground layer in some areas of these swamps. Floristically, the longwall and control swamps are similar.

Within the variability of this dataset, a general trend towards increasing height and cover of the mid layer vegetation and reduction in cover of the ground layer has occurred across the baseline and mining period, including spring 2019, 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 fire, which reduces the cover of these obligate seeders.

In spring 2019, a slight increase in the cover of the mid layer vegetation was observed within longwall swamps not subject to WaterNSW hazard reduction burns (Swamps 40, 41 and 53). In longwall sites which were subject to 2017 hazard reduction burns (Swamps 46 and 51/52), cover of the ground layer was variable, but an overall increase has been observed since the burns. The cover and height of the mid layer in the quadrats affected by the burn had an initial dramatic decrease in the season following the burn and has remained minimal since. The height and cover of the mid storey was variable within and between control swamps, but overall there has been an increase in cover from autumn 2019.

Species richness

A summary of species richness within swamp quadrats since spring 2015 is provided in **Figure 6** and **Table 4**. The raw data for each swamp is presented in **Appendix E**.

Species richness within individual valley side swamps in spring 2019 was within the range previously recorded across all previous monitoring seasons for three of the five longwall sites (Swamps 41, 46 and 51/52) and three of the five control sites (Swamps 135, 136 and 137a). The species richness at two longwall (Swamps 40 and 53) and two control (Swamps 101 and 137b) sites was lower than previously recorded across all survey seasons. An overall decrease in species richness has been recorded at Swamps 40 and 53 since the baseline period (declining by 14 and 15 species, respectively, over that time) and Swamp 101 since spring 2017 (declining by 15 species over that time) (**Figure 6**).

An increase in species richness from autumn 2019 was observed at three of the five longwall sites (Swamps 41, 46 and 51/52), with increases ranging from one to seven species. At control sites, an increase in species richness was recorded at three sites (Swamps 135, 136 and 137a) compared to the

autumn 2019 survey, with increases ranging from three to seven species. As noted earlier, Swamp 46 and Swamp 51/52 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey and prior to the spring 2017 survey. These burns may account for the increase in species richness at these swamps observed since this time (**Figure 6**).

Despite the minor season to season increase in species richness observed at some sites in spring 2019, over the entire monitoring period there has been a declining trend in species richness across most longwall and control sites since the baseline period (prior to spring 2017). The exceptions to this trend are the two longwall sites in which the WaterNSW hazard reduction burns were carried out and control Swamp 137a, which currently has species richness levels similar to the baseline period, following three consecutive seasons of increases. As declines in species richness have been observed across both longwall and control sites, these changes are considered to be due to natural fluctuations in response to weather, population dynamics, seasonality of survey and natural disturbances including grazing by fauna species. The current spring 2019 survey was undertaken following an extended period of predominantly dry conditions, which may contribute to decreased species richness within some sites.

Species richness data were analysed for each season using analysis of variance (ANOVA). No significant differences have been detected between longwall and control sites in any season including the current spring 2019 ($p = 0.217$), **Figure 7**. Data for all seasons from Swamp 46 and Swamp 51/52, which were subject to hazard reduction burns, are excluded from this analysis.

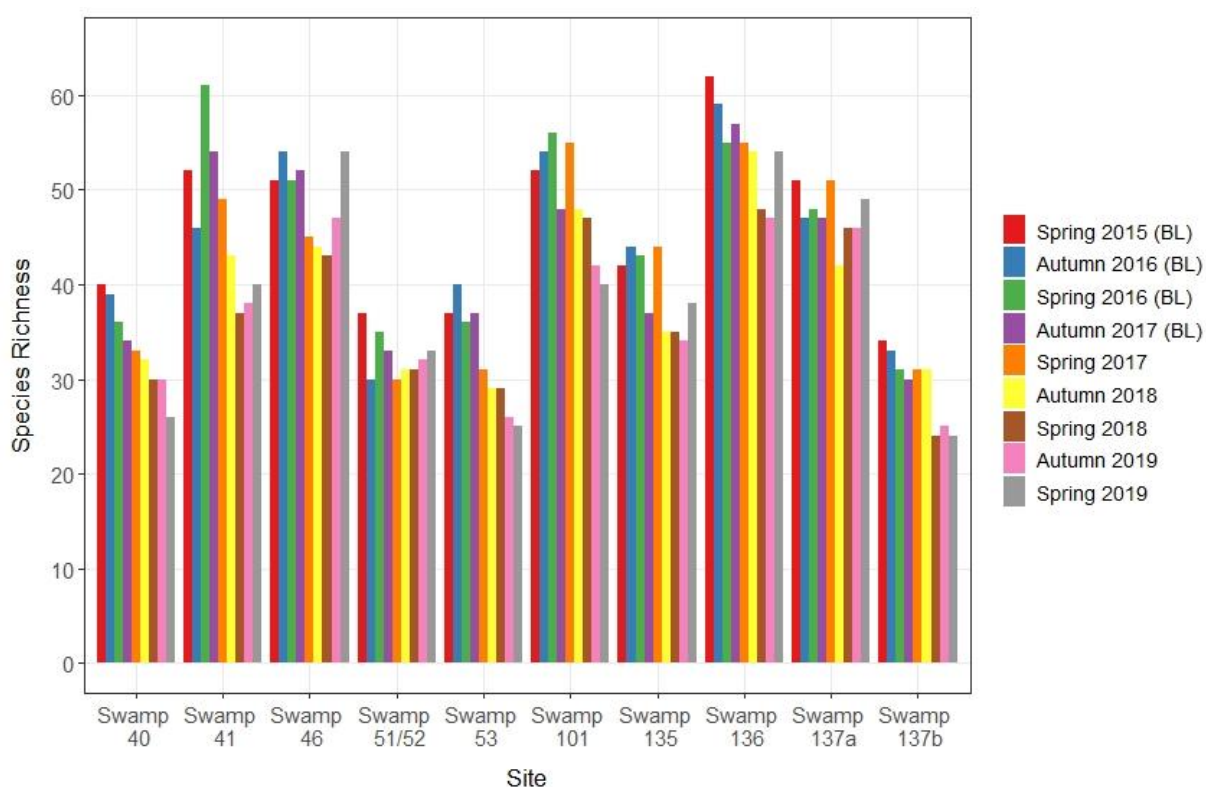


Figure 6: Native species richness in upland swamp sites, spring 2015 to spring 2019, BL = baseline.

Table 4: Number of species recorded in upland swamps (spring 2015 to spring 2019).

Site	Spring 2015	Autumn 2016	Spring 2016	Autumn 2017	Spring 2017	Autumn 2018	Spring 2018	Autumn 2019	Spring 2019
Longwall swamps									
Swamp 40	40	39	36	34	33	32	30	30	26
Swamp 41	52	46	61	54	49	43	37	38	40
Swamp 46*	51	54	51	52	45	44	43	47	54
Swamp 51/52*	37	30	35	33	30	31	31	32	33
Swamp 53	37	40	36	37	31	29	29	26	25
Control swamps									
Swamp 101	52	54	56	48	55	48	47	42	40
Swamp 135	42	44	43	37	44	35	35	34	38
Swamp 136	62	59	55	57	55	54	48	47	54
Swamp 137a	51	47	48	47	51	42	46	46	49
Swamp 137b	34	33	31	30	31	31	24	25	24

* Subject to WaterNSW hazard reduction burns between autumn 2017 and spring 2017 surveys

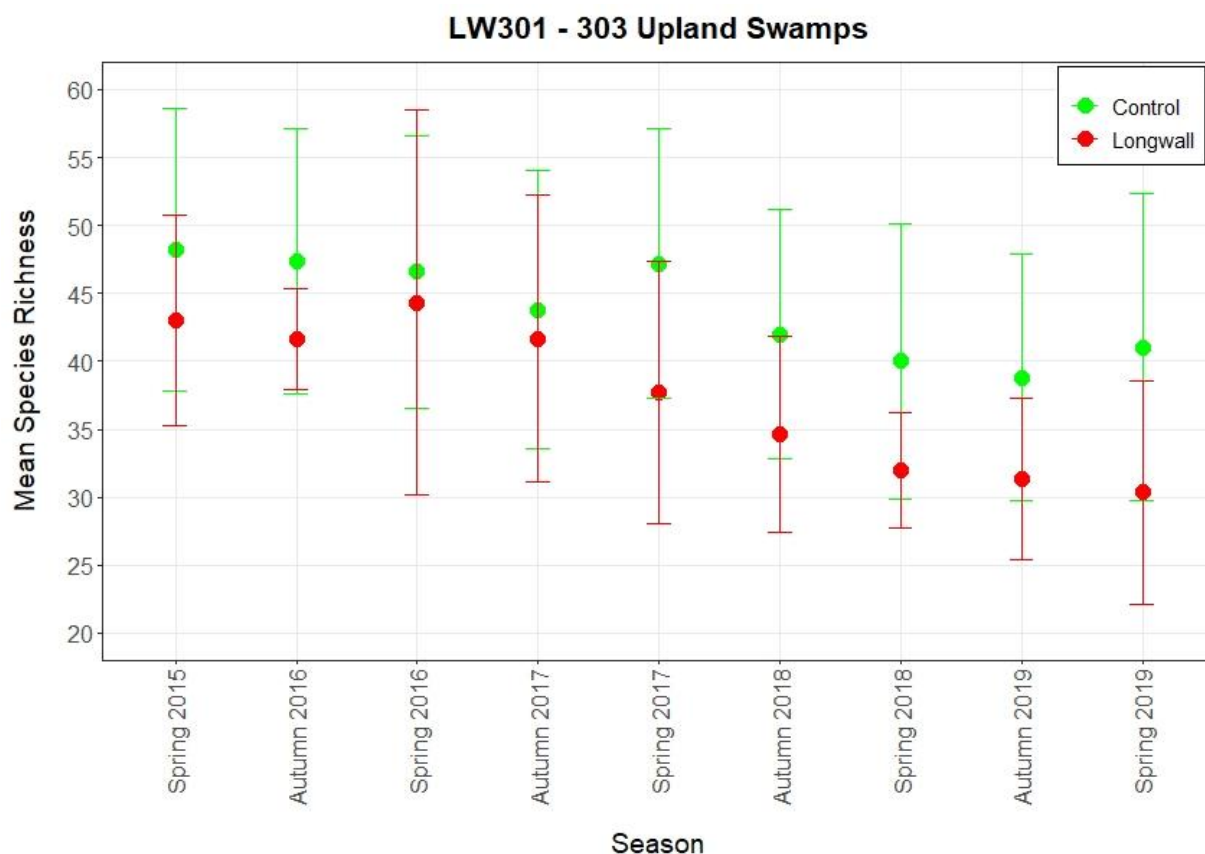


Figure 7: Mean species richness for longwall and control sites in valley side swamps, spring 2015 to spring 2019⁴.

⁴ All data from Swamp 46 and Swamp 51/52, which were subject to hazard reduction burns, are excluded from the analyses.

Cover Abundance and Condition

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

Cover abundance

Fluctuations in species cover were recorded across all sites. For swamps not subject to the WaterNSW hazard reduction burns, 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. Following the 2017 hazard reduction burns in Swamp 46 and Swamp 51/52, an overall decrease in cover of the mid layer was observed for plots which has been burnt. Prior to these burns the mid layer in these plots was very dense (typically >50% cover), which shaded out the lower layer resulting in a relatively sparse ground cover. The opening-up of the mid layer following the fire has resulted in the germination of many seedlings, producing a lower layer with higher covers than observed pre-fire. The composition of the lower layer, however, has changed from being dominated by sedge species, e.g. *Lepidosperma neesii*, *Empodisma minus* and *Schoenus brevifolius*, to a mix of newly germinated seedlings of species that typically make up both the lower and mid storey layers.

Analysis of similarities (ANOSIM) was used to examine the differences in species cover/abundance over time between longwall and control sites for each season, and the results are presented in **Table 5**. Data for all seasons from Swamp 46 and Swamp 51/52, which were subject to hazard reduction burns, are excluded from this analysis. Significant differences in the vegetation composition of longwall and control sites, as measured by cover/abundance, have been recorded across all baseline monitoring seasons and monitoring seasons following the commencement of mining Longwalls 301-303. In spring 2019 significant differences were again recorded. This suggests the observed differences are attributed to pre-existing differences in vegetation composition between these swamps, driven by factors other than longwall mining, such as fire history, swamp size and landscape position.

Table 5: Analysis of Similarities (ANOSIM) for vegetation cover/abundance in upland swamps (spring 2015 to autumn 2019)⁵.

Season	R-statistic	p-value
Spring 2015	0.792	0.001
Autumn 2016	0.8366	0.001
Spring 2016	0.8391	0.001
Autumn 2017	0.8127	0.001
Spring 2017	0.765	0.001
Autumn 2018	0.8023	0.001
Spring 2018	0.7836	0.001
Autumn 2019	0.8227	0.001
Spring 2019	0.7911	0.001

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

⁵ For autumn 2019 all data from Swamp 46 and Swamp 51/52, which were subject to hazard reduction burns, are excluded from the analyses. Figures may differ from the previous monitoring report, as data from Swamp 46 and Swamp 51/52 had only been excluded for the season (spring 2017) after which the hazard reduction burns had been conducted.

Condition

Fluctuations in vegetation condition were also recorded across all sites. Generally, vegetation within upland swamps was in a healthy condition throughout the survey period and observations of dieback were limited to a small number of species and scattered individuals within swamps. Excluding swamps subject to hazard reduction burns, a number of species were observed with dieback, ranging from minor dieback (Condition 4) to severe dieback (Condition 1), with the following species observed with some dieback in both longwall and control sites: *Banksia ericifolia* subsp. *ericifolia*, *Chordifex fastigiatus*, *Cyathochaeta diandra*, *Empodisma minus*, *Hakea teretifolia*, *Lepidosperma neesii*, *Leptocarpus tenax*, *Leptospermum squarrosum*, *Ptilothrix deusta*, *Schoenus brevifolius* and *Xanthorrhoea resinosa*. These species have been observed with similar levels of dieback during the baseline monitoring period.

Most species observed with dieback within longwall swamps in spring 2019 were also recorded with dieback within control swamps. Species observed with dieback in longwall swamps and not observed with dieback in control swamps (where the species occurred in both longwall and control swamps) were *Entolasia stricta*, *Leptospermum trinervium* and *Patersonia sericea*. For the *Entolasia stricta*, this was limited to two individuals displaying minor dieback (Condition 4), *Leptospermum trinervium* was isolated to an individual displaying minor dieback (Condition 3) and *Patersonia sericea* was isolated to an individual displaying minor dieback (Condition 4). Five species were observed with dieback within control swamps and not observed with dieback within longwall swamps (where the species occurred in both longwall and control swamps), namely *Baekkea imbricata*, *Cassytha glabella*, *Corymbia gummifera*, *Lepyrodi scariosa* and *Petrophile pulchella*.

Mean vegetation condition was lower in longwall swamps than in control swamps for a number of species, particularly *Hakea teretifolia* which was commonly observed with minor dieback (Condition 4) or some dead branches (Condition 3) and occasionally many dead branches (Condition 2) in longwall sites, whilst it was commonly observed as healthy (Condition 5), occasionally with minor dieback (Condition 4) in control swamps.

Analysis of similarities (ANOSIM) was used to examine the differences in vegetation condition over time between longwall and control sites for each season, and the results are presented in **Table 6**. Data for all seasons from Swamp 46 and Swamp 51/52, which were subject to hazard reduction burns, are excluded from this analysis. Significant differences between longwall and control sites in the vegetation composition, as measured by the condition of species assemblages, were recorded across all baseline monitoring seasons and monitoring seasons following the commencement of mining Longwalls 301-303. In spring 2019 significant differences were again recorded. This suggests the observed differences are attributed to pre-existing differences in vegetation composition and condition between these swamps, driven by factors other than longwall mining.

Table 6: Analysis of Similarities (ANOSIM) for vegetation condition in upland swamps (spring 2015 to autumn 2019)⁶.

Season	R-statistic	p-value
Spring 2015	0.814	0.001
Autumn 2016	0.8251	0.001
Spring 2016	0.7965	0.001
Autumn 2017	0.7833	0.001
Spring 2017	0.8168	0.001
Autumn 2018	0.8182	0.001
Spring 2018	0.7624	0.001
Autumn 2019	0.8564	0.001
Spring 2019	0.8086	0.001

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

4.3 Indicator species monitoring

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

Subsequent to the autumn 2017 baseline survey and prior to the spring 2017 survey, Swamp 51/52 was subject to WaterNSW hazard reduction burns, resulting in the death of indicator species in Swamp 51/52. As a result, the monitoring results for both indicator species excludes data from Swamp 51/52 for all seasons, including baseline monitoring seasons.

Condition scale

Mean vegetation condition of tagged *Epacris obtusifolia* and *Sprengelia incarnata* across all longwall and control swamps are shown in **Figure 8** and **Figure 9**. The mean vegetation condition of tagged *Epacris obtusifolia* and *Sprengelia incarnata* within individual longwall and control sites are shown in **Figure 10a** and **Figure 10b**.

⁶ For spring 2019 all data from Swamp 46 and Swamp 51/52, which were subject to hazard reduction burns, are excluded from the analyses. Figures may differ from the previous monitoring report, as data from Swamp 46 and Swamp 51/52 had only been excluded for the season (spring 2017) after which the hazard reduction burns had been conducted.

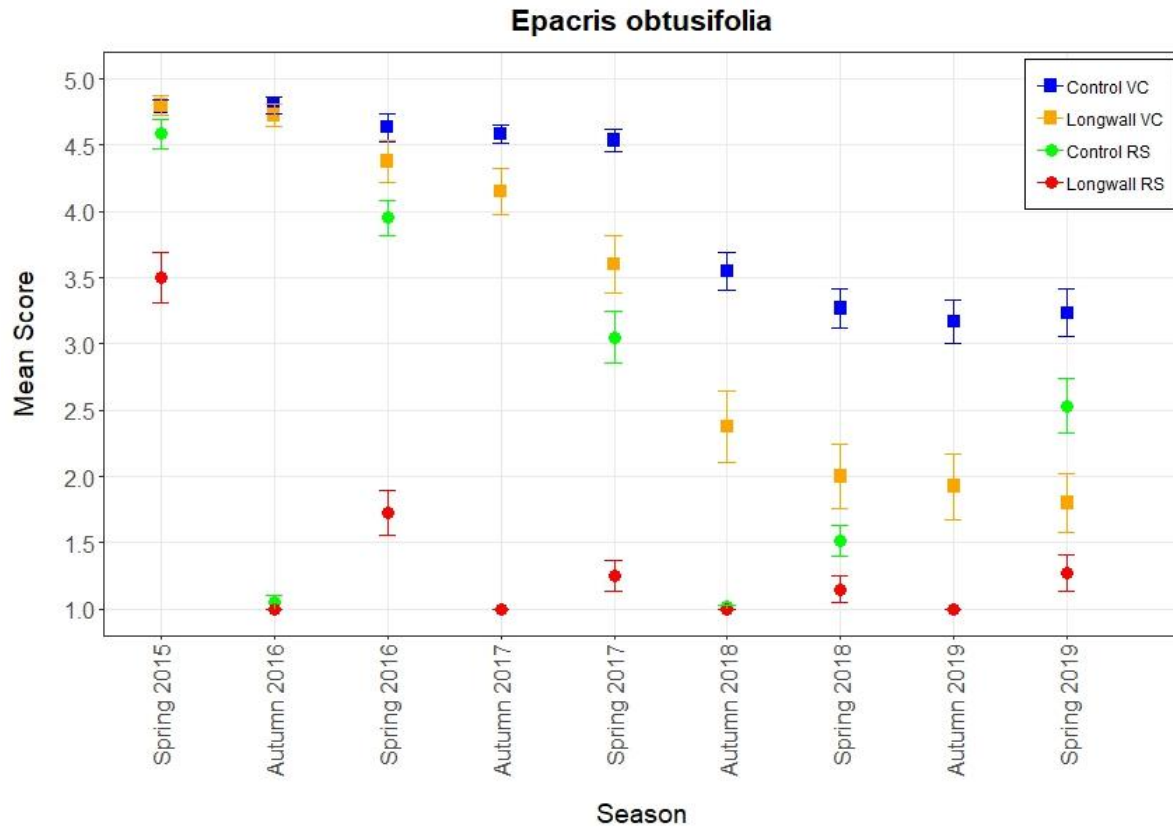


Figure 8: Mean scores for Vegetation Condition (VC) and mean Reproductive Status (RS) for the indicator species, *Epacris obtusifolia* (spring 2015 to spring 2019).

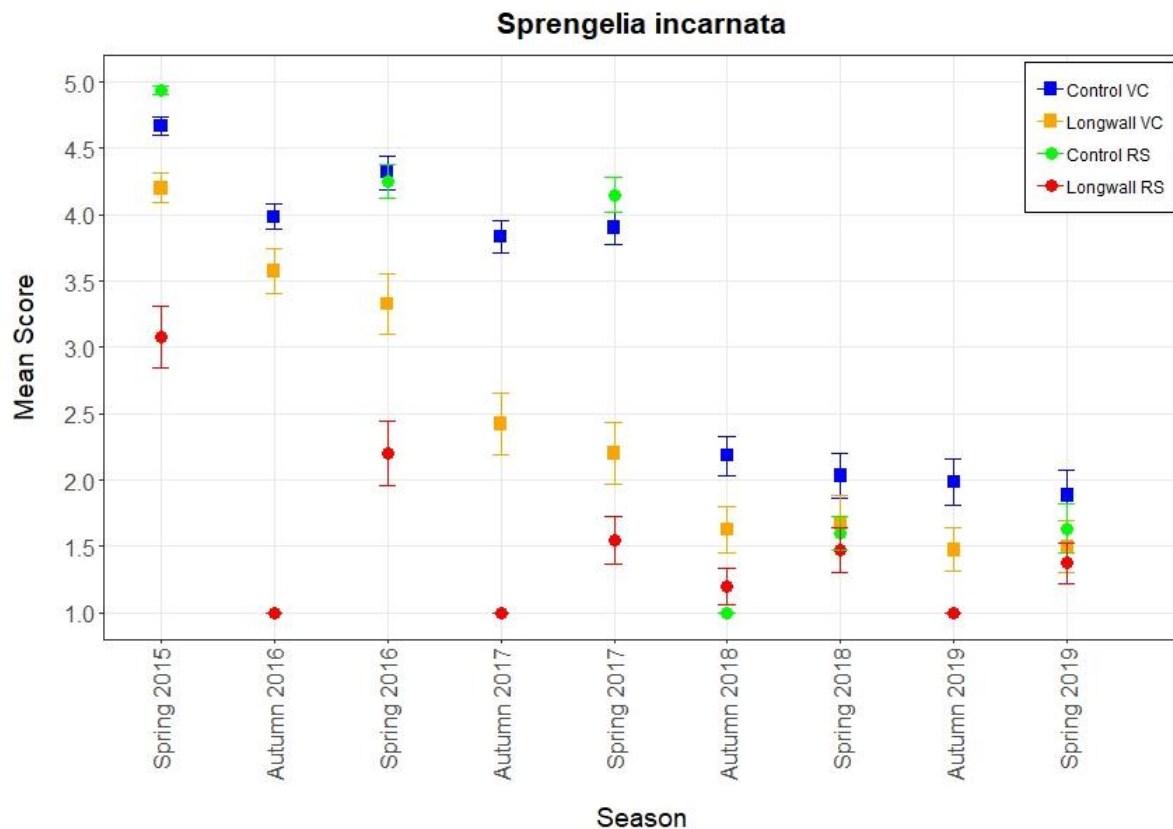


Figure 9: Mean scores for Vegetation Condition (VC) and mean Reproductive Status (RS) for the indicator species, *Sprengelia incarnata* (spring 2015 to spring 2019).

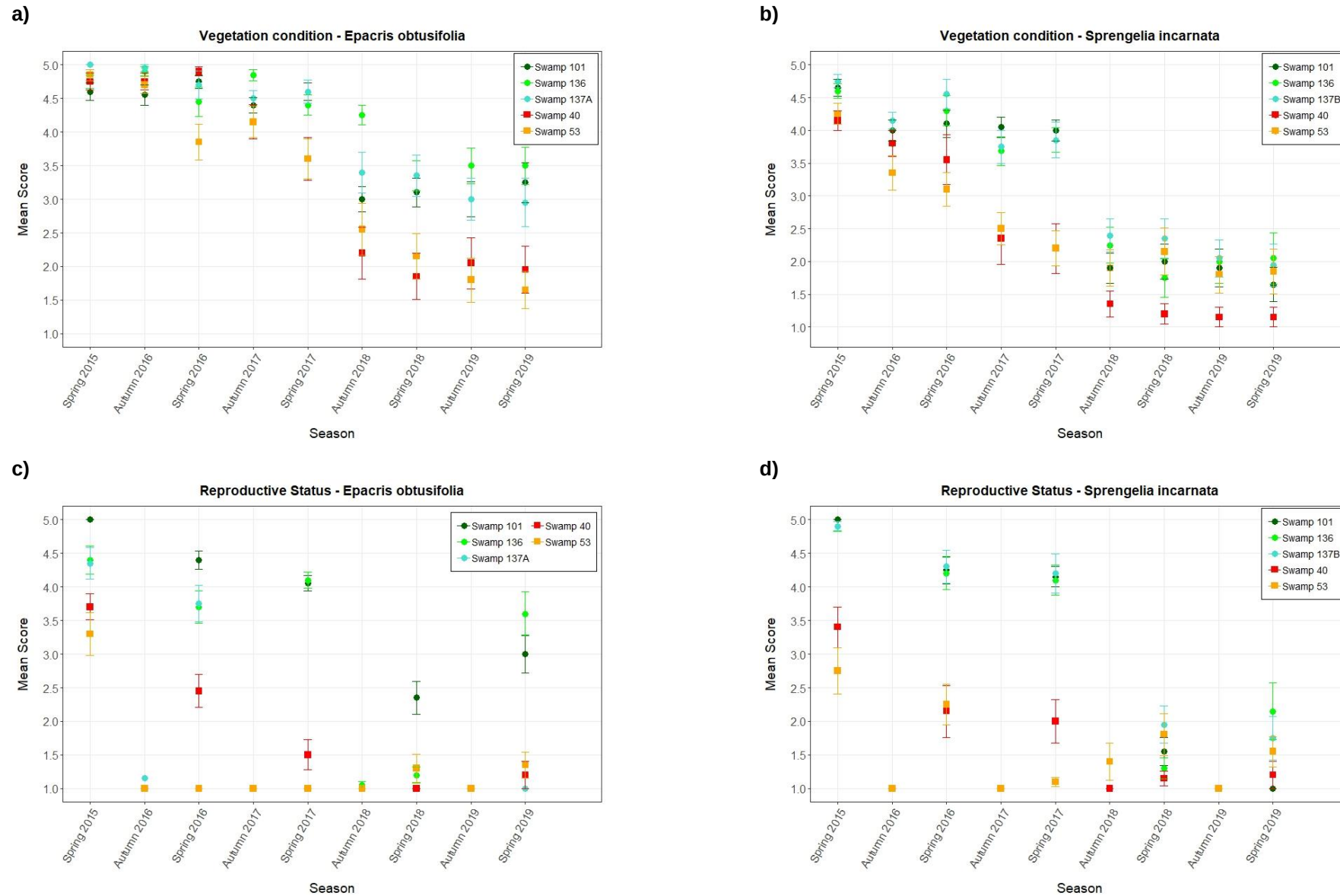


Figure 10: Mean scores for indicator species monitoring at individual sites: a) Vegetation Condition for *Epacris obtusifolia*; b) Vegetation Condition for *Sprengelia incarnata*; c) Reproductive Status for *Epacris obtusifolia*; d) Reproductive Status for *Sprengelia incarnata*.

Across the baseline monitoring period (spring 2015 – autumn 2017), the mean vegetation condition of tagged *Epacris obtusifolia* individuals in longwall swamps was variable with an overall small decline observed, whilst mean vegetation condition remained relatively stable at control sites (**Figure 8**). A declining trend has been observed within both control and longwall sites for this species, since autumn 2017. The mean vegetation condition for tagged *Epacris obtusifolia* has been dissimilar between longwall and control sites across all monitoring seasons since autumn 2017, as indicated by the non-overlapping error bars, with mean vegetation condition at control sites consistently greater than at longwall sites since the baseline period, including the current spring 2019 survey. Since autumn 2018, the mean vegetation condition of tagged *Epacris obtusifolia* individuals has been lower than the range observed across the baseline monitoring seasons for both longwall and control sites. As declines in vegetation condition of *Epacris obtusifolia* have occurred at both longwall and control swamps it is considered to reflect the natural fluctuations in plant health associated with herbivory, resource competition, ageing plants and, in particular, the ongoing drought conditions, following an extended period of below-average rainfall from July 2017 onward.

When the vegetation condition of indicator species is considered at the individual swamp level (**Figure 10a**), it can be seen that mean vegetation condition of tagged *Epacris obtusifolia* individuals in spring 2019 was lower than the range observed in all baseline monitoring seasons at all sites. Prior to autumn 2018, the mean vegetation condition for control sites was usually clustered and generally above 4.5. Between autumn 2018 and the current spring 2019 survey, the mean vegetation condition was more variable across all sites, however the control sites (Swamps 101, 136 and 137a) were generally in a higher condition than the longwall sites (Swamps 40 and 53).

Across the baseline period (spring 2015 – autumn 2017), the mean vegetation condition of tagged *Sprengelia incarnata* individuals consistently declined in longwall swamps, and, whilst it was more variable in control sites, an overall decrease was observed (**Figure 9**). In autumn 2019, the mean vegetation condition of tagged *Sprengelia incarnata* individuals was lower than the range observed across the baseline period for both longwall and control sites. The mean vegetation condition for tagged *Sprengelia incarnata* has been dissimilar between longwall and control sites in all seasons (with the exception of spring 2018 season) as indicated by the non-overlapping error bars. In the current spring 2019 season, the mean vegetation condition of tagged *Sprengelia incarnata* individuals is greater at control sites than longwall sites, although the error bars are touching. As declines in vegetation condition of *Sprengelia incarnata* have occurred at both longwall and control swamps, it is considered to reflect the natural fluctuations in plant health associated with herbivory, resource competition, ageing plants and, in particular, the ongoing drought conditions, following an extended period of below-average rainfall from July 2017 onward.

When considered at the individual swamp level (**Figure 10b**), the mean vegetation condition of tagged *Sprengelia incarnata* individuals was similar across most sites in spring 2019, clustering around vegetation condition score 2. The exception was longwall Swamp 40, which remains significantly lower than the other sites, a result observed since autumn 2018. The large declines in vegetation condition observed in autumn 2018 have not been repeated in any monitoring seasons since.

Reproductive status

Mean reproductive status of tagged *Epacris obtusifolia* and *Sprengelia incarnata* across all longwall and control swamps are shown in **Figure 8** and **Figure 9**. The mean reproductive status of tagged *Epacris obtusifolia* and *Sprengelia incarnata* within individual longwall and control swamps are shown in **Figure 10c** and **Figure 10d**.

The mean reproductive status, as recorded by the flowering status, of tagged indicator species shows that across all seasons, flowering has been highly variable, particularly within control sites (**Figure 8** and

Figure 9). The mean reproductive status of tagged indicator species has also been variable between longwall and control swamps in individual seasons, with no discernible trend in the difference between longwall and control sites. Across all survey seasons, flowering status has generally been greater during the spring surveys, with minimal flowering recorded during any of the autumn surveys for both species. Where flowering has been recorded, it has generally been greater within control sites than longwall sites, as indicated by non-overlapping error bars for most seasons, with the scale of these differences greater than one.

For *Epacris obtusifolia*, flowering in spring 2019 was greater than that recorded in the spring 2018 survey for both longwall and control sites, whilst for *Sprengelia incarnata* flowering was similar in spring 2019 at both longwall and control sites compared to spring 2018. As with previous spring surveys, reproductive status was higher in control sites for *Epacris obtusifolia* (**Figure 8**). For *Sprengelia incarnata*, mean reproductive status was similar for control and longwall sites, as it has been for all seasons since the end of the baseline period (**Figure 9**).

When considered at the individual swamp level, the seasonal fluctuations in the mean reproductive status of tagged indicator species have generally been consistent across sites for both *Epacris obtusifolia* and *Sprengelia incarnata* (**Figure 10c** and **Figure 10d**). For *Epacris obtusifolia*, however, Swamp 40 has been largely responsible for the seasonal peaks in mean reproductive status for longwall sites. During the current spring 2019 season, an increase in *Epacris obtusifolia* reproductive status from the previous spring season was recorded for all sites except control Swamp 137a, which recorded no flowering in either season. Mean reproductive status was more variable across sites in spring 2019 for *Sprengelia incarnata* compared with spring 2018, with some sites increasing (Swamps 40 and 136) and others decreasing (Swamps 53, 101 and 137b) (**Figure 10d**).

Proportion of plants surviving

The total number of tagged indicator species recorded in Condition 1 across all longwall and control swamps is presented in **Table 7**. In spring 2019, 118 of the tagged indicator species were recorded in Condition 1, increasing from 111 individuals in autumn 2019 (**Table 7**). From autumn 2019 to spring 2019, 7 tagged indicator species individuals declined to Condition 1 after being in a healthier condition in autumn 2019.

The proportion of the total number of tagged individuals of each indicator species which have been recorded as dead in each season is presented in **Figure 11** and **Figure 12**. In spring 2019 the proportion of upland swamp indicator species which were dead was greater at longwall sites than control sites for both indicator species, *Epacris obtusifolia* and *Sprengelia incarnata*.

In spring 2019, the proportion of *Epacris obtusifolia* individuals recorded in Condition 1 was greater in longwall swamps (0.73) than in control swamps (0.23). The higher proportion of *Epacris obtusifolia* individuals recorded in Condition 1 in longwall swamps has been recorded since autumn 2017, during the baseline period (**Figure 11**). The large increase in proportion dead of *Epacris obtusifolia* individuals in longwall sites recorded in autumn 2018 followed a particularly dry spring and summer, with rainfall falling well below average for every month from July 2017. The drought effects of this period, as reflected in the high mortality of tagged *Epacris obtusifolia* individuals, were more extreme in the longwall swamps, compared to the control swamps. Since autumn 2018, the seasonal increase in proportion dead has been similar between longwall and control sites.

In spring 2019 the proportion of *Sprengelia incarnata* recorded in Condition 1 was greater in longwall swamps (0.85) than in control swamps (0.68). The higher proportion of dead individuals of *Sprengelia incarnata* within longwall sites compared to control sites has been recorded across all monitoring seasons, including the baseline period (**Figure 12**). Likewise, the seasonal increases in proportion dead

in longwall sites have been consistent across the entire monitoring period, including during the baseline period. In contrast to *Epacris obtusifolia*, a large increase in the proportion dead of *Sprengelia incarnata* individuals was recorded in control sites in autumn 2018. It appears that the drought effects which followed the particularly dry spring and summer of 2017/2018, as reflected in the high mortality of tagged *Sprengelia incarnata* individuals, were more extreme in the control swamps, compared to the longwall swamps. Since the large increase in proportion dead observed for control sites in autumn 2018, the seasonal increases have been consistent in control sites.

The spring 2019 survey was conducted following an extremely dry period from July 2017 onwards, with monthly rainfall well below average for most months preceding the spring 2019 survey, apart from October and November 2018. Mortality of tagged indicator species may be attributed to environmental conditions including the stress associated with drying out of shallow soils during periods of below-average rainfall.

Table 7: Number of tagged indicator species individuals recorded in Condition 1 across longwall and control swamps (spring 2015 – spring 2019).

Indicator species	Site	Spring 2015	Autumn 2016	Spring 2016	Autumn 2017	Spring 2017	Autumn 2018	Spring 2018	Autumn 2019	Spring 2019
<i>Epacris obtusifolia</i>	Swamp 101	0	0	0	0	0	1	2	4	4
	Swamp 136	0	0	1	0	0	0	2	3	3
	Swamp 137a	0	0	1	0	0	3	4	6	7
	Control subtotal	0	0	2	0	0	4	8	13	14
	Swamp 40	0	0	0	1	3	13	14	14	14
	Swamp 53	0	0	1	1	3	10	12	15	15
	Longwall subtotal	0	0	1	2	6	23	26	29	29
Total <i>Epacris obtusifolia</i>		0	0	3	2	6	27	34	42	43
<i>Sprengelia incarnata</i>	Swamp 101	0	0	0	0	0	10	11	13	14
	Swamp 136	0	0	1	2	2	9	14	13	14
	Swamp 137b	0	0	1	2	2	7	9	11	13
	Control subtotal	0	0	2	4	4	26	34	37	41
	Swamp 40	0	1	5	11	13	17	18	19	19
	Swamp 53	0	3	3	5	8	11	12	13	15
	Longwall subtotal	0	4	8	16	21	28	30	32	34
Total <i>Sprengelia incarnata</i>		0	4	10	20	25	54	64	69	75
TOTAL		0	4	13	22	31	81	98	111	118

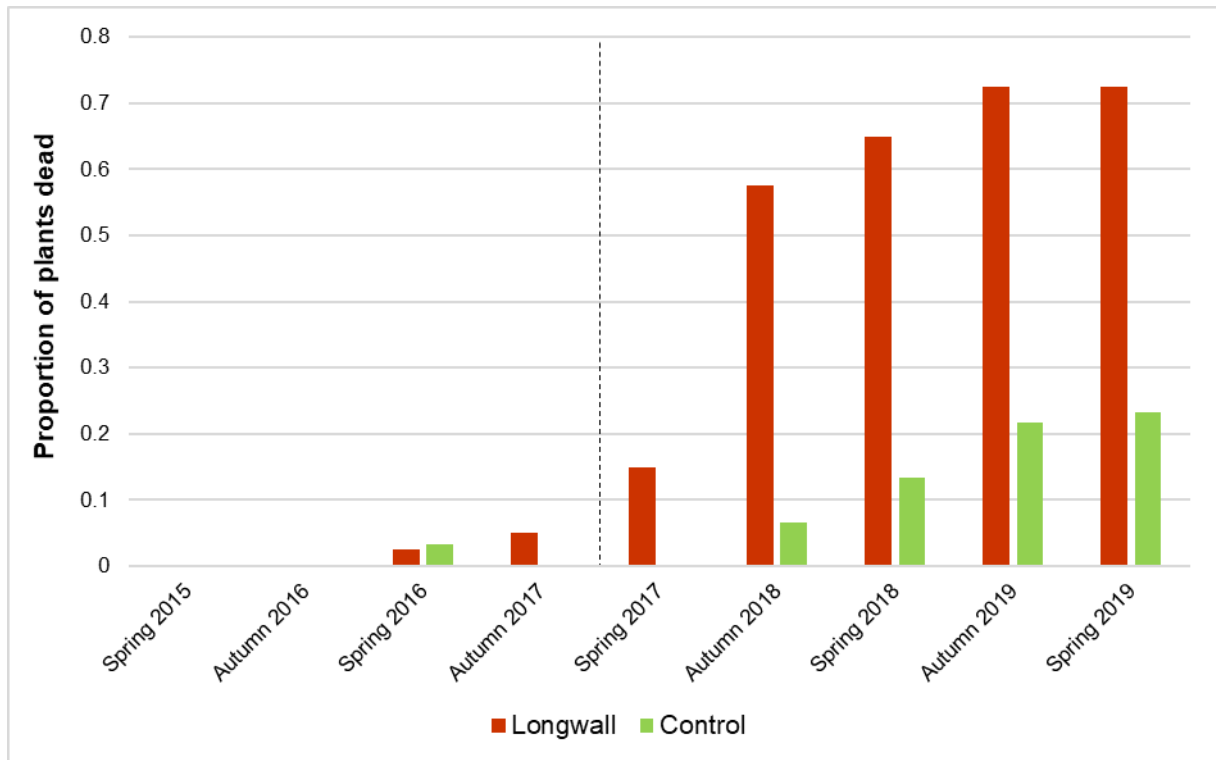


Figure 11: Proportion of tagged *Epacris obtusifolia* which have died at longwall and control swamps (spring 2015 to spring 2019). Dashed line indicates change from baseline monitoring seasons to monitoring undertaken during mining of Longwalls 301-303.

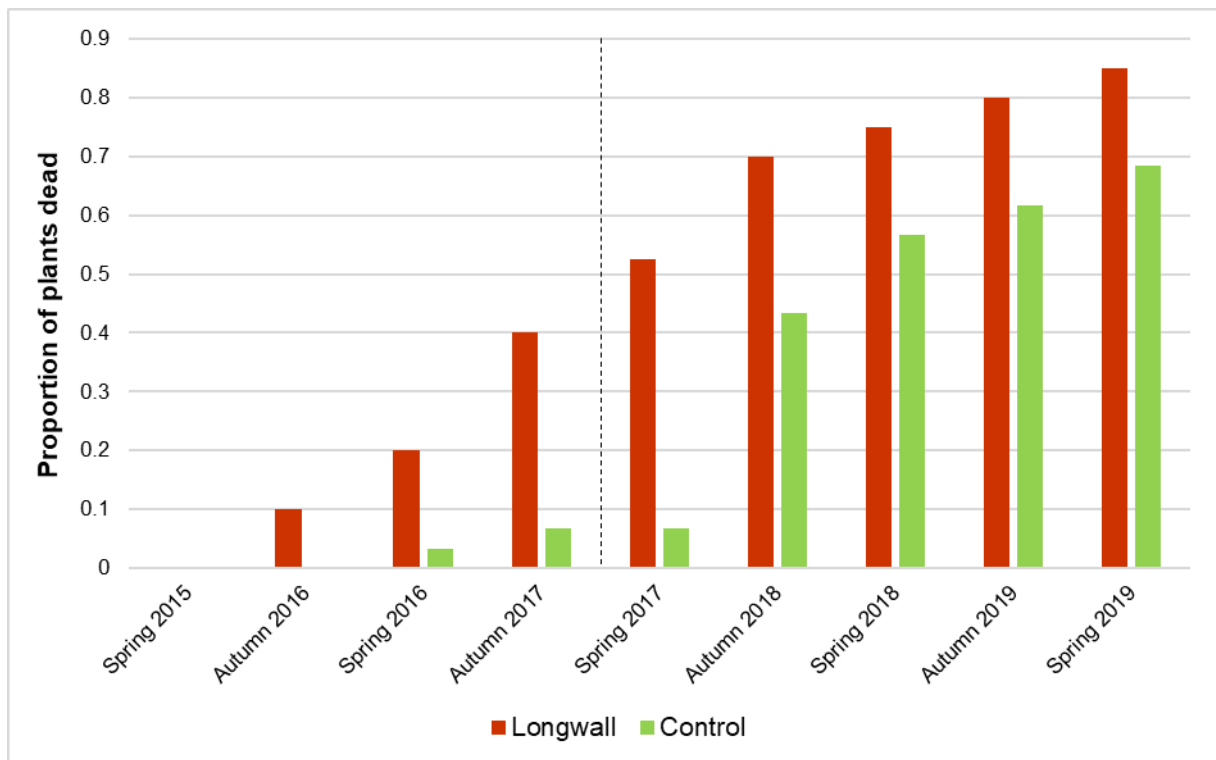


Figure 12: Proportion of tagged *Sprengelia incarnata* which have died at longwall and control swamps (spring 2015 to spring 2019). Dashed line indicates transition from baseline monitoring seasons to monitoring undertaken during mining of Longwall 301-303.

4.4 Assessment against performance indicators

In accordance with the Longwalls 301-303 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, quadrat and indicator species monitoring results are described in **Section 4.1** to **4.3**.

The Upland Swamp Vegetation Trigger Action Response Plan (TARP) from the Longwalls 301-303 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 8**.

Table 8: 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
<i>The vegetation in upland swamps is not expected to experience changes significantly different to vegetation in control swamps</i>	- Swamps 38, 40, 41, 46², 47, 48, 49, 50, 51/52², 53 and 58 overlying or adjacent to Longwalls 301-303. - Control Swamps 101, 111a, 125, 135, 136, 137a, 137b and 138.	Longwalls (LW) 301-303 swamps, as detailed in the LW301-303 vegetation monitoring report for the spring 2015 to autumn 2017 surveys¹.	Level 1	Data analysis indicates ³ : - 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 38, 46, 47, 48, 49, 50, 51/52 and 58.	Continue monitoring. Six monthly reporting.	Monitoring to continue.
			Level 2	Data analysis indicates ³ : - 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.	Swamps, 40, 41 and 53.	Consider swamp groundwater monitoring data. Six monthly reporting.	Vegetation monitoring indicates a declining trend in the condition of longwall swamp vegetation in spring 2019 in Swamp 40 and 53, however a similar trend is occurring in control swamp vegetation. Vegetation monitoring indicates a significant difference in vegetation condition between longwall (Swamps 40, 41 and 53) and control swamps in spring 2019, however swamp vegetation is consistent with the baseline monitoring results. Continue close monitoring of trends in vegetation to assess the contribution of dry climatic conditions versus mine subsidence impacts.
			Level 3	Data analysis indicates ³ : - 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 ⁴ . Consider the need for management measures, in accordance with Sections 8 and 9.	—

¹ Eco Logical Australia (2018) *Metropolitan Coal Vegetation Monitoring Longwalls 301-303 Spring 2015 – Autumn 2017*. Report prepared for Metropolitan Coal Pty Ltd.

² Subsequent to the autumn 2017 baseline survey and prior to the spring 2017 survey, Swamp 46 and Swamp 51/52 were subject to WaterNSW hazard reduction burns.

³ Not applicable to vegetation subject to the hazard reduction burns conducted by WaterNSW in 2017 (i.e. Swamps 46 and 51/52).

⁴ 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).

4.5 Significant species

Two species of conservation significance were recorded within upland swamps from visual inspections and transect/quadrat data during the spring 2019 survey season, namely *Darwinia diminuta* and *Pultenaea aristata* (Table 9 and Appendix E). Generally, significant species observed during spring 2019 were in healthy condition (Condition 5) or with minor dieback (Condition 4) and predominantly found in control sites (Table 9).

Table 9: 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 101, 136 and 137a. Observed in healthy condition in all swamps in spring 2019.
<i>Pultenaea aristata</i>	V	V	2V	Swamps 46, 101, 135 and 136. Recorded in healthy condition in all swamps 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:
 - 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
 - i = less than 1000 plants are known to occur within a conservation reserve(s)

4.6 Introduced species

No weed species were observed within any of the control or longwall swamp transects in spring 2019.

Weeds have been observed in low densities in previous monitoring seasons. These observations occurred:

- on the track between Swamp 46 and Swamp 41;
- along the drainage line within, and on the track adjacent to, Swamp 47;
- within Swamp 50 and on the access track into Swamp 50;
- along the 4WD track into Swamp 51/52; and
- adjacent to the edge of Swamp 58.

These weed species include *Andropogon virginicus* (Whiskey Grass), *Axonopus fissifolius* (Narrow-leaved Carpet Grass), *Conyza* sp. (Fleabane), *Crocasmia* sp. (Coppertips), *Watsonia meriana* var. *bulbillifera*, *Hypochaeris radicata* (Catsear) and *Crocasmia* × *crocosmiiflora* (Montbretia).

5 Conclusions

5.1 Upland swamp vegetation monitoring

The key findings of the Longwalls 301-303 spring 2019 upland swamp vegetation survey (since the previous autumn 2019 survey) can be summarised as follows:

- Vegetation monitoring in upland Swamps 38, 46, 47, 48, 49, 50, 51/52 and 58 indicates there is no declining trend in the condition of the swamp vegetation and there are no significant changes in vegetation between these longwall and control swamps. These swamps therefore remain at 'significance Level 1' in accordance with the upland swamp vegetation monitoring TARP.
- Vegetation monitoring indicates a declining trend in the condition of longwall swamp vegetation in Swamp 40 and 53, however a similar trend is occurring in control swamp vegetation. Vegetation monitoring also indicates a significant difference in vegetation condition and cover/abundance data, between longwall Swamps 40, 41 and 53 and control swamps in spring 2019, however swamp vegetation is consistent with the baseline monitoring results. Swamps 40, 41 and 53 therefore remain at 'significance Level 2' 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.

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Metropolitan Coal Upland Swamp Vegetation Monitoring

Longwalls 301-303 Spring 2019 Appendices

Prepared for
Metropolitan Coal

12 October 2020



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Template 29/9/2015

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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

* 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 2019

Species: *Epacris obtusifolia*Site No: **S40**

Date:

Recorder:

Tag Colour: **Orange**

Tag Number	Easting	Northing	Condition	Height	Rating – Flowers	Rating – Fruit	Notes
EE1							
EE2							
EE3							
EE4							
EE5							
EE6							
EE7							
EE8							
EE9							
EE10							
EE11							
EE12							
EE13							
EE14							
EE15							
EE16							
EE17							
EE18							
EE19							
EE20							

Reproductive Ratings

- | | |
|--------------|--------------------------|
| 1 – Nil | |
| 2 – Sparse | occasional flowers only |
| 3 – Low | under 25% of potential |
| 4 – Moderate | 25% – 75% of potential |
| 5 – High | 75% – 100 % of potential |

Condition

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

Eco Logical Australia 2010

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 301-303 – Vegetation Monitoring Sites

Site	Monitoring techniques	Control / LW	Location	Indicator species monitoring	Easting	Northing	Transect details
S38	Visual observations only	LW	LW301	–	312685	6215548	
S40	Visual observations; Transects/quadrats, Population monitoring of indicator species	LW	LW302-303	<i>Epacris obtusifolia</i> <i>Sprengelia incarnata</i>	312428 312460 312487	6215943 6215908 6215902	T1 – 25 m – 240 ° T2 – 25 m – 210° T3 – 35 m – 210°
S41	Visual observations; Transects/quadrats	LW	LW301-302	–	312717 312789 312811	6216116 6216147 6216116	T1 – 30 m – ~200° T2 – 45 m – 200° T3 – 75 m – 200°
S46	Visual observations; Transects/quadrats	LW	Chain pillar between LW302 and LW303	–	312639 312635 312652	6216404 6216343 6216315	T1 – 20 m – 280° T2 – 20 m – 280° T3 – 30 m – 280°
S47	Visual observations only	LW	Within 35° angle of draw	–	312434	6216438	–
S48	Visual observations only	LW	Within 35° angle of draw	–	312167	6216405	–
S49	Visual observations only	LW	Within 35° angle of draw	–	312327	6216604	–
S50	Visual observations only	LW	Within 35° angle of draw	–	312526	6217003	–
S51/S52	Visual observations; Transects/quadrats, Population monitoring of indicator species*	LW	LW303	<i>Epacris obtusifolia</i> <i>Sprengelia incarnata</i>	312709 312635 312698	6126897 6216875 6216813	T1 – 35 m – 250° T2 – 40 m – 260° T3 – 30 m – 270°
S53	Visual observations; Transects/quadrats, Population monitoring of indicator species	LW	LW302 and chain pillar between LW303	<i>Epacris obtusifolia</i> <i>Sprengelia incarnata</i>	312796 312850 312845	6216932 6216849 6216835	T1 – 15 m – ~265 ° T2 – 60 m – 280° T3 – 35 m – 250°
S58	Visual observations only	LW	LW303	–	312776	6217387	–
S101	Visual observations; Transects/quadrats, Population monitoring of indicator species	Control	East of Fire Road 9	<i>Epacris obtusifolia</i> <i>Sprengelia incarnata</i>	308675 308812 308686	6216577 6216608 6216600	T1 – 45 m – 90° T2 – 40 m – 60° T3 – 50 m – 50°
S111a	Visual observations only	Control	East of Fire Road 9	–	308854 308856 308876	6216998 6217043 6217089	–
S125	Visual observations only	Control	North-west of Fire Road 9D	–	309729 309713 309704	6218920 6218858 6218834	–
S135	Visual observations; Transects/quadrats	Control	East of Fire Road 9	–	308917 308929 308958	6217265 6217238 6217171	T1 – 20 m – 130° T2 – 30 m – 130° T3 – 20 m – 140°
S136	Visual observations; Transects/quadrats, Population monitoring of indicator species	Control	East of Fire Road 9	<i>Epacris obtusifolia</i> <i>Sprengelia incarnata</i>	308772 308777 308787	6216717 6216727 6216761	T1 – 40 m – 110° T2 – 30 m – 85° T3 – 35 m – 85°

Longwalls 301-303 – Vegetation Monitoring Sites

Site	Monitoring techniques	Control / LW	Location	Indicator species monitoring	Easting	Northing	Transect details
S137a	Visual observations; Transects/quadrats, Population monitoring of indicator species	Control	West of Fire Road 9	<i>Epacris obtusifolia</i>	308373 308457 308459	6217178 6217225 6217040	T1 – 40 m – 275° T2 – 25 m – 250° T3 – 30 m – 210°
S137b	Visual observations; Transects/quadrats, Population monitoring of indicator species	Control	West of Fire Road 9	<i>Sprengelia incarnata</i>	308408 308405 308361	6216982 6216933 6216929	T1 – 45 m – 280° T2 – 40 m – 270° T3 – 25 m – 290°
S138	Visual observations only	Control	East of Fire Road 9	–	308679 308718 308794	6216492 6216491 6216507	–

* Indicator species monitoring for this swamp was discontinued from Spring 2017 due to all individuals being killed during WaterNSW hazard reduction burns following the autumn 2017 baseline survey.

Appendix C : Upland swamp performance indicators – Table 12 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	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 (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).

Appendix D : Species lists – Upland swamp monitoring sites

Longwalls 301-303 – Spring 2019

Species list – Upland swamp sites

Family	Species	Common Name
Anthericaceae	<i>Thysanotus juncifolius</i>	
Apiaceae	<i>Actinotus minor</i>	Lesser Flannel Flower
	<i>Platysace linearifolia</i>	
	<i>Xanthosia tridentata</i>	Rock Xanthosia
Casuarinaceae	<i>Allocasuarina distyla</i>	
	<i>Allocasuarina littoralis</i>	Black She-Oak
Colchicaceae	<i>Burchardia umbellata</i>	Milkmaids
Cunoniaceae	<i>Bauera microphylla</i>	
	<i>Bauera rubioides</i>	River Rose
Cyperaceae	<i>Chorizandra cymbaria</i>	
	<i>Cyathochaeta diandra</i>	
	<i>Lepidosperma filiforme</i>	
	<i>Lepidosperma limicola</i>	
	<i>Lepidosperma neesii</i>	
	<i>Ptilothrix deusta</i>	
	<i>Schoenus brevifolius</i>	
	<i>Schoenus ericetorum</i>	
Dilleniaceae	<i>Hibbertia riparia</i>	
	<i>Hibbertia serpyllifolia</i>	Hairy Guinea Flower
Droseraceae	<i>Drosera peltata</i>	A Sundew
	<i>Drosera spatulata</i>	
Ericaceae	<i>Epacris microphylla</i>	Coral Heath
	<i>Epacris obtusifolia</i>	Blunt-leaf Heath
	<i>Leucopogon esquamatus</i>	
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	
	<i>Sprengelia incarnata</i>	Pink Swamp Heath
Euphorbiaceae	<i>Micrantheum ericoides</i>	
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	
	<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 tuberculata</i>	
	<i>Sphaerolobium vimineum</i>	
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>	Red-stemmed Wattle
	<i>Acacia</i> sp.	Wattle
Gleicheniaceae	<i>Gleichenia microphylla</i>	Scrambling Coral Fern
Goodeniaceae	<i>Dampiera stricta</i>	
	<i>Goodenia bellidifolia</i>	
	<i>Goodenia hederacea</i>	Ivy Goodenia
	<i>Goodenia heterophylla</i>	
Haloragaceae	<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
Lomandraceae	<i>Lomandra filiformis</i>	Wattle Matt-rush
	<i>Lomandra obliqua</i>	
	<i>Lomandra</i> sp.	Mat-rush
Myrtaceae	<i>Baeckea imbricata</i>	
	<i>Callistemon citrinus</i>	Crimson Bottlebrush

Longwalls 301-303 – Spring 2019

Species list – Upland swamp sites

Family	Species	Common Name
	<i>Corymbia gummifera</i>	Red Bloodwood
	<i>Darwinia diminuta</i> ▲2RCi	
	<i>Darwinia fascicularis</i>	
	<i>Eucalyptus racemosa</i>	Narrow-leaved Scribbly Gum
	<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 squarrosum</i>	
	<i>Leptospermum trinervium</i>	Slender Tea-tree
	<i>Micromyrtus ciliata</i>	Fringed Heath-myrtle
Orchidaceae	<i>Cryptostylis erecta</i>	Tartan Tongue Orchid
	<i>Cryptostylis subulata</i>	Large Tongue Orchid
	<i>Orchidaceae indeterminate</i>	Orchids
Poaceae	<i>Anisopogon avenaceus</i>	Oat Speargrass
	<i>Entolasia stricta</i>	Wiry Panic
	<i>Tetrarrhena turfosa</i>	
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	
	<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 laevipes</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>	
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>	
Rhamnaceae	<i>Cryptandra ericoides</i>	Heathy Cryptandra
Santalaceae	<i>Leptomeria acida</i>	Sour Currant Bush
Schizaeaceae	<i>Schizaea bifida</i>	Forked Comb Fern
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>	
	<i>Xanthorrhoea</i> sp.	

++ 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

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

Appendix E : Vegetation monitoring raw data

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

Upland swamp monitoring sites – Spring 2019

Swamp 40 – 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					
S40T1Q1S19	M1	1.5	4.5	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S40T1Q2S19	M1	2	5.5	45	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S40T1Q3S19	M1	2	5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1	1	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S40T1Q4S19	M1	1.4	3	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S40T1Q5S19	M1	1.1	2.5	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	15	<i>Chordifex fastigiatus</i> , <i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S40T1Q6S19	M1	0.5	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Baekkea imbricata</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	10	<i>Chordifex fastigiatus</i> , <i>Schoenus brevifolius</i>
Transect 2					
S40T2Q1S19	M1	4	4.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	0.3	1	<i>Lepidosperma neesii</i> , <i>Empodisma minus</i>
S40T2Q2S19	M1	1.7	4	45	<i>Hakea teretifolia</i>
	L1	0	0.6	1.5	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S40T2Q3S19	M1	2	4	30	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.6	1	<i>Lepidosperma neesii</i> , <i>Empodisma minus</i> , <i>Schoenus brevifolius</i>
S40T2Q4S19	M1	3	6	35	<i>Leptospermum juniperinum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	1	<i>Schoenus brevifolius</i> , <i>Empodisma minus</i> , <i>Lepidosperma neesii</i>
S40T2Q5S19	M1	4	6	35	<i>Hakea teretifolia</i> , <i>Leptospermum juniperinum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.6	5	<i>Lepidosperma neesii</i> , <i>Empodisma minus</i> , <i>Schoenus brevifolius</i>
S40T2Q6S19	M1	3.5	4.2	40	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	15	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i> , <i>Xanthorrhoea resinosa</i>
Transect 3					
S40T3Q1S19	M1	2	4	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum juniperinum</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	5	<i>Schoenus brevifolius</i> , <i>Chorizandra cymbaria</i> , <i>Ptilothrix deusta</i>
S40T3Q2S19	M1	2	5	20	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>

Upland swamp monitoring sites – Spring 2019

Swamp 40 – 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	5	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S40T3Q3S19	M1	3.5	4	35	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.6	10	<i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S40T3Q4S19	M1	4	6	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1	10	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S40T3Q5S19	M1	3	5	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum juniperinum</i>
	L1	0	1.2	20	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S40T3Q6S19	M1	1.5	3.5	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum juniperinum</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Ptilothrix deusta</i> , <i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S40T3Q7S19	M1	1.6	4.2	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	5	<i>Schoenus brevifolius</i> , <i>Empodisma minus</i> , <i>Ptilothrix deusta</i> ,
S40T3Q8S19	M1	2.5	5	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	15	<i>Ptilothrix deusta</i> , <i>Chordifex fastigiatus</i> , <i>Empodisma minus</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.

Upland swamp monitoring sites – Spring 2019

Swamp 41 – 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					
S41T1Q1S19	T	6	8	5	<i>Corymbia gummifera</i>
	M1	4	5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.7	5	<i>Chorizandra cymbaria</i> , <i>Ptilothrix deusta</i>
S41T1Q2S19	M1	5	6	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.3	1	<i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
S41T1Q3S19	M1	2	5.8	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	1	<i>Ptilothrix deusta</i>
S41T1Q4S19	M1	4	6	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	5	<i>Xanthorrhoea</i> sp.
S41T1Q5S19	M1	5	6	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.1	1	<i>Ptilothrix deusta</i> , <i>Entolasia stricta</i>
S41T1Q6S19	M1	4	5	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.5	1	<i>Lepidosperma neesii</i>
S41T1Q7S19	M1	4	5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.2	1	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
Transect 2					
S41T2Q1S19	M1	1.5	4	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea laevipes</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	20	<i>Anisopogon avenaceus</i> , <i>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i>
S41T2Q2S19	M1	2	5.5	30	<i>Corymbia gummifera</i> , <i>Leptospermum trinervium</i>
	L1	0	0.7	5	<i>Empodisma minus</i> , <i>Ptilothrix deusta</i>
S41T2Q3S19	M1	3	7	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Allocasuarina distyla</i>
	L1	0	0.5	5	<i>Xanthorrhoea</i> sp., <i>Ptilothrix deusta</i>
S41T2Q4S19	M1	4	6	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.1	1	<i>Xanthorrhoea</i> sp., <i>Ptilothrix deusta</i>
S41T2Q5S19	M1	5	6	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.7	1	<i>Xanthorrhoea</i> sp., <i>Ptilothrix deusta</i> , <i>Schoenus brevifolius</i>
S41T2Q6S19	M1	4	5	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.4	1	<i>Ptilothrix deusta</i>
S41T2Q7S19	M1	4	7	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>

Upland swamp monitoring sites – Spring 2019

Swamp 41 – 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	1	<i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
S41T2Q8S19	M1	4	5	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	1	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
S41T2Q09S19	M1	4	4.8	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	5	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S41T2Q10S19	M1	4	5	50	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.6	1	<i>Lepidosperma neesii</i>
Transect 3					
S41T3Q1S19	M1	5	7	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S41T3Q2S19	M1	4	5	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.4	1	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S41T3Q3S19	M1	5	6	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	0.4	1	<i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i> , <i>Lindsaea linearis</i>
S41T3Q4S19	M1	4	7	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	40	<i>Xanthorrhoea</i> sp., <i>Ptilothrix deusta</i>
S41T3Q5S19	M1	3	5	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	0.4	1	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S41T3Q6S19	M1	4	5	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	10	<i>Cyathochaeta diandra</i> , <i>Xanthorrhoea</i> sp., <i>Ptilothrix deusta</i>
S41T3Q7S19	M1	1.6	5	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0		20	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S41T3Q8S19	M1	1.7	3.5	50	<i>Leptospermum squarrosum</i>
	L1	0	0.6	20	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S41T3Q9S19	M1	2.3	5	80	<i>Allocasuarina distyla</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	20	<i>Lepidosperma neesii</i> , <i>Leptocarpus tenax</i> , <i>Ptilothrix deusta</i>
S41T3Q10S19	M1	2	5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	20	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S41T3Q11S19	M1	2	4	60	<i>Leptospermum squarrosum</i> , <i>Allocasuarina distyla</i>
	L1	0	1.2	20	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>

Upland swamp monitoring sites – Spring 2019

Swamp 41 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S41T3Q12S19	M1	3	5	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.1	20	<i>Ptilothrix deusta</i> , <i>Xanthorrhoea</i> sp., <i>Lepidosperma neesii</i>
S41T3Q13S19	M1	4	6	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i> , <i>Xanthorrhoea</i> sp.
S41T3Q14S19	M1	3	5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum polygalifolium</i> , <i>Persoonia pinifolia</i>
	L1	0	1.1	15	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S41T3Q15S19	M1	3	4	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	5	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S41T3Q16S19	M1	2	4	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0		1	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</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.

Upland swamp monitoring sites – Spring 2019

Swamp 46* – 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					
S46T1Q1S19	T	4.5	4.5	50	<i>Allocasuarina distyla</i> , <i>Corymbia gummifera</i>
	M1	0.7	3	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	50	<i>Leptocarpus tenax</i> , <i>Actinotus minor</i>
S46T1Q2S19	M1	1	4	15	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.3	15	<i>Leptocarpus tenax</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S46T1Q3S19	M1	1	3	15	<i>Allocasuarina distyla</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea gibbosa</i>
	L1	0	0.3	20	<i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S46T1Q4S19	L1	0	2	35	<i>Xanthorrhoea resinosa</i> , <i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
S46T1Q5S19	L1	0	1.2	80	<i>Xanthorrhoea resinosa</i>
Transect 2					
S46T2Q1S19	M1	1.5	6	70	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Allocasuarina littoralis</i>
	L1	0	2.2	30	<i>Xanthorrhoea resinosa</i>
S46T2Q2S19	M1	2.5	4	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Allocasuarina distyla</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	30	<i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S46T2Q3S19	M1	1.2	3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.8	20	<i>Ptilothrix deusta</i> , <i>Schoenus brevifolius</i>
S46T2Q4S19	M1	1.3	4	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Allocasuarina distyla</i> , <i>Empodisma minus</i>
	L1	0	1	35	<i>Lepidosperma filiforme</i> , <i>Chordifex fastigiatus</i> , <i>Lepyrodia scariosa</i>
S46T2Q5S19	M1	1	2.2	35	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Epacris microphylla</i>
	L1	0	1.2	10	<i>Lepidosperma filiforme</i>
Transect 3					
S46T3Q1S19	M1	1.6	6	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	25	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S46T3Q2S19	M1	4	5	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	10	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S46T3Q3S19	M1	2	5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.5	15	<i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
S46T3Q4S19	M1	3.5	5	50	<i>Corymbia gummifera</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	20	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>

Upland swamp monitoring sites – Spring 2019

Swamp 46* – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S46T3Q5S19	M1	2.6	4	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.4	5	<i>Ptilothrix deusta</i> , <i>Xanthorrhoea resinosa</i>
S46T3Q6S19	M1	1	3.5	75	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.9	5	<i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
S46T3Q7S19	M1	1.2	3	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Lambertia formosa</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.3	10	<i>Chordifex fastigiatus</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.

* portions of Swamp 46 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey

Upland swamp monitoring sites – Spring 2019

Swamp 51/52* – 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					
S51/52T1Q1S19	M1	4	5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.3	1	<i>Ptilothrix deusta</i> , <i>Xanthorrhoea resinosa</i> , <i>Lepidosperma filiforme</i>
S51/52T1Q2S19	M1	4	4.5	70	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.3	1	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S51/52T1Q3S19	M1	4	6	40	<i>Leptospermum squarrosum</i>
	L1	0	0.7	1	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S51/52T1Q4S19	L1	0	0.8	1	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S51/52T1Q5S19	L1	0	1.1	20	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S51/52T1Q6S19	L1	0	1	5	<i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
S51/52T1Q7S19	L1	0	1.2	20	<i>Xanthorrhoea resinosa</i> , <i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S51/52T1Q8S19	M1	2	3	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.9	10	<i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
Transect 2					
S51/52T2Q1S19	M1	4	6	20	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Allocasuarina littoralis</i>
	L1	0	0.2	1	<i>Entolasia stricta</i>
S51/52T2Q2S19	M1	4	5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.1	1	<i>Lepidosperma neesii</i>
S51/52T2Q3S19	M1	4	4	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.5	5	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S51/52T2Q4S19	M1	2	4	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S51/52T2Q5S19	M1	1.6	3	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.8	15	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i> , <i>Empodisma minus</i>
S51/52T2Q6S19	M1	3	4	20	<i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Empodisma minus</i> , <i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S51/52T2Q7S19	M1	1.6	2.7	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.1	10	<i>Ptilothrix deusta</i> , <i>Empodisma minus</i>
S51/52T2Q8S19	M1	2.5	3	20	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	15	<i>Lepyrodia scariosa</i> , <i>Lepidosperma neesii</i>

Upland swamp monitoring sites – Spring 2019

Swamp 51/52* – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S51/52T2Q9S19	M1	1	3.6	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	10	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
Transect 3					
S51/52T3Q1S19	M1	4	6	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.9	15	<i>Ptilothrix deusta</i> , <i>Entolasia stricta</i>
S51/52T3Q2S19	M1	3	4	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	10	<i>Entolasia stricta</i> , <i>Ptilothrix deusta</i> , <i>Empodisma minus</i>
S51/52T3Q3S19	M1	3	4	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	15	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S51/52T3Q4S19	M1	4	4	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.2	1	<i>Ptilothrix deusta</i>
S51/52T3Q5S19	M1	3	4	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	5	<i>Ptilothrix deusta</i>
S51/52T3Q6S19	M1	4	5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.6	10	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S51/52T3Q7S19	M1	4	4	15	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Allocasuarina littoralis</i>
	L1	0	1	10	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</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.

* portions of Swamp 51/52 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey

Upland swamp monitoring sites – Spring 2019

Swamp 53 – 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					
S53T1Q1S19	M1	1.5	3.5	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.1	5	<i>Ptilothrix deusta</i> , <i>Empodisma minus</i> , <i>Xanthorrhoea resinosa</i>
S53T1Q2S19	M1	1.5	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	30	<i>Xanthorrhoea resinosa</i> , <i>Empodisma minus</i>
S53T1Q3S19	M1	1	3	75	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	25	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S53T1Q4S19	M1	0.3	3.2	35	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.6	10	<i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
Transect 2					
S53T2Q1S19	M1	4	4.5	15	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	1	<i>Lepidosperma neesii</i>
S53T2Q2S19	M1	4	4.5	35	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.1	5	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S53T2Q3S19	M1	4.5	5	90	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.7	5	<i>Xanthorrhoea resinosa</i>
S53T2Q4S19	M1	4	5.5	80	<i>Persoonia pinifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.2	1	<i>Entolasia stricta</i>
S53T2Q5S19	M1	6	8	5	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.4	5	<i>Xanthorrhoea resinosa</i>
S53T2Q6S19	M1	2	8	20	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.2	1	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S53T2Q7S19	M1	4	5	80	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.2	1	<i>Xanthorrhoea resinosa</i>
S53T2Q8S19	M1	4	4.5	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.6	10	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S53T2Q9S19	M1	1.8	4	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	0.4	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S53T2Q10S19	M1	1	2.3	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Lepidosperma filiforme</i>

Upland swamp monitoring sites – Spring 2019

Swamp 53 – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S53T2Q11S19	M1	1.6	2.2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	10	<i>Lepidosperma filiforme</i>
S53T2Q12S19	M1	1.6	2.3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.1	1	<i>Lepyrodia scariosa</i>
S53T2Q13S19	M1	1.5	2.4	75	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.8	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
Transect 3					
S53T3Q1S19	M1	4	4.5	80	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.1	1	<i>Ptilothrix deusta</i>
S53T3Q2S19	M1	4.5	4.5	80	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.1	1	<i>Xanthorrhoea resinosa</i>
S53T3Q3S19	M1	5	7	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Lepidosperma neesii</i>
S53T3Q4S19	M1	5	6	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.1	5	<i>Lepidosperma neesii</i> , <i>Xanthorrhoea resinosa</i>
S53T3Q5S19	M1	3.5	4	35	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.7	5	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S53T3Q6S19	M1	3.5	4	60	<i>Leptospermum squarrosum</i>
	L1	0	0.4	5	<i>Ptilothrix deusta</i>
S53T3Q7S19	M1	4	6	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	20	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S53T3Q8S19	M1	4.5	4.5	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	1	<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.

Upland 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>
	L1	0	1.2	5	
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>

Upland 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
S101T2Q5S19	M1	0.3	2	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	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>Baeckea imbricata</i>

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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	1.1	30	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Lepyrodia scariosa</i>
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.

Upland Swamp monitoring sites – Spring 2019

Swamp 135 – 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					
S135T1Q1S19	M1	0.4	2.2	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	40	<i>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i> , <i>Leptocarpus tenax</i>
S135T1Q2S19	M1	1.4	2.6	0.8	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1.4	10	<i>Lepidosperma neesii</i> , <i>Cyathochaeta diandra</i> , <i>Chordifex fastigiatus</i>
S135T1Q3S19	M1	0.5	2.4	85	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1	1	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S135T1Q4S19	M1	1.7	2.3	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	0.8	1	<i>Lepidosperma neesii</i> , <i>Cyathochaeta diandra</i> , <i>Schoenus brevifolius</i>
S135T1Q5S19	M1	0.6	2.4	65	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	5	<i>Xanthorrhoea resinosa</i> , <i>Cyathochaeta diandra</i>
Transect 2					
S135T2Q1S19	M1	0.6	2	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.1	20	<i>Cyathochaeta diandra</i> , <i>Leptocarpus tenax</i> , <i>Lepidosperma neesii</i>
S135T2Q2S19	M1	0.7	2	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S135T2Q3S19	M1	1	2.5	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1.1	5	<i>Lepidosperma neesii</i> , <i>Xanthorrhoea resinosa</i> , <i>Cyathochaeta diandra</i>
S135T2Q4S19	M1	0.4	3.1	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	5	
S135T2Q5S19	M1	1	2.5	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	10	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S135T2Q6S19	M1	1.2	2.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.4	5	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i> , <i>Schoenus brevifolius</i>
S135T2Q7S19	M1	1	2.8		<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	20	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
Transect 3					
S135T3Q1S19	M1	10	2.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Epacris microphylla</i>
	L1	0	1.4	25	<i>Xanthorrhoea resinosa</i> , <i>Ptilothrix deusta</i>
S135T3Q2S19	M1	0.5	1.6	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>

Upland Swamp monitoring sites – Spring 2019

Swamp 135 – 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	1.2	30	<i>Xanthorrhoea resinosa</i> , <i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S135T3Q3S19	M1	0.4	2.2	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	15	<i>Lepidosperma neesii</i> , <i>Leptocarpus tenax</i>
S135T3Q4S19	M1	0.1	2	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	5	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S135T3Q5S19	M1	0.1	2	5	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.5	10	<i>Schoenus brevifolius</i> , <i>Drosera peltata</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.

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – 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					
S136T1Q1S19	T	6	8	40	<i>Corymbia gummifera</i>
	M1	1	3	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.1	50	<i>Cyathochaeta diandra</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S136T1Q2S19	M1	1.3	3.3	65	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Epacris obtusifolia</i>
	L1	0	1.1	15	<i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
S136T1Q3S19	M1	1.5	3	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.8	10	<i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i>
S136T1Q4S19	M1	1.2	3.5	45	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	15	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S136T1Q5S19	M1	1.3	3	40	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.6	20	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S136T1Q6S19	M1	1.7	4	55	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S136T1Q7S19	M1	1.2	2.5	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.8	15	<i>Lepidosperma neesii</i> , <i>Leptospermum squarrosum</i> , <i>Cyathochaeta diandra</i>
S136T1Q8S19	M1	1.6	3.3	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S136T1Q9S19	M1	0.3	2	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1	10	<i>Ptilothrix deusta</i>
Transect 2					
S136T2Q1S19	M1	1	2.5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Hakea teretifolia</i>
	L1	0	1	40	<i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S136T2Q2S19	M1	0.7	2.5	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S136T2Q3S19	M1	0.5	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.2	30	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Lepyrodia scariosa</i>
S136T2Q4S19	M1	2	3.7	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S136T2Q5S19	M1	1.7	3.7	65	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – 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	1.1	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S136T2Q6S19	M1	2	3.5	45	<i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1	20	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S136T2Q7S19	M1	1.7	4.2	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.5	1	<i>Entolasia stricta</i>
Transect 3					
S136T3Q1S19	M1	0.3	1.8	70	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	0.6	10	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S136T3Q2S19	M1	0.2	2.2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1	5	<i>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i>
S136T3Q3S19	M1	0.2	2	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1.2	10	<i>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i>
S136T3Q4S19	M1	0.3	2	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	0.3	20	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Ptilothrix deusta</i>
S136T3Q5S19	M1	1	2.5	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1.5	10	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i>
S136T3Q6S19	M1	0.6	2	25	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	50	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S136T3Q7S19	M1	0.3	1.8	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Chordifex fastigiatus</i>
S136T3Q8S19	M1	0.3	2	30	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	15	<i>Ptilothrix deusta</i> , <i>Cassytha glabella</i> , <i>Dampiera stricta</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.

Upland Swamp monitoring sites – Spring 2019

Swamp 137a – 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					
S137aT1Q1S19	M1	0.5	2.5	40	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	0.8	20	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S137aT1Q2S19	M1	0.4	3	65	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Isopogon anethifolius</i>
	L1	0	1.4	10	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
S137aT1Q3S19	M1	1	2.5	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	30	<i>Xanthorrhoea resinosa</i> , <i>Cyathochaeta diandra</i> , <i>Schoenus brevifolius</i>
S137aT1Q4S19	M1	1	3	80	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.4	5	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i> , <i>Schoenus brevifolius</i>
S137aT1Q5S19	M1	1.5	3	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	5	<i>Schoenus brevifolius</i>
S137aT1Q6S19	M1	1	3	80	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.4	5	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
S137aT1Q7S19	M1	0.9	2.5	60	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	10	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S137aT1Q8S19	M1	1	2.6	65	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.4	25	<i>Chordifex fastigiatus</i> , <i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
S137aT1Q9S19	M1	1	2.5	50	<i>Persoonia pinifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	40	<i>Xanthorrhoea resinosa</i> , <i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i>
Transect 2					
S137aT2Q1S19	M1	0.4	2.3	35	<i>Petrophile pulchella</i> , <i>Hakea teretifolia</i> , <i>Epacris microphylla</i>
	L1	0	1	15	<i>Chordifex fastigiatus</i>
S137aT2Q2S19	M1	1	5	70	<i>Allocasuarina littoralis</i> , <i>Petrophile pulchella</i> , <i>Hakea teretifolia</i>
	L1	0	1.5	15	<i>Cyathochaeta diandra</i> , <i>Leptocarpus tenax</i> , <i>Lepidosperma neesii</i>
S137aT2Q3S19	M1	1	3.2	40	<i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i> , <i>Dillwynia floribunda</i>
	L1	0	1.4	5	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i> , <i>Chordifex fastigiatus</i>
S137aT2Q4S19	M1	1.5	2.2	40	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	10	<i>Lepidosperma neesii</i> , <i>Leptocarpus tenax</i>
S137aT2Q5S19	T	6.5	7	10	<i>Eucalyptus racemosa</i>
	M1	1.4	2.2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>

Upland Swamp monitoring sites – Spring 2019

Swamp 137a – 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	15	<i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
S137aT2Q6S19	M1	0.5	1.7	40	<i>Leptospermum squarrosum</i> , <i>Kunzea capitata</i> , <i>Darwinia fascicularis</i>
	L1	0	1	5	<i>Lepyrodia scariosa</i> , <i>Lepidosperma neesii</i>
Transect 3					
S137aT3Q1S19	M1	1	2.5	50	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.5	10	<i>Leptocarpus tenax</i> , <i>Lepidosperma neesii</i>
S137aT3Q2S19	M1	1	2.2	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	0.6	10	<i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
S137aT3Q3S19	M1	0.4	1.8	40	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	20	<i>Cyathochaeta diandra</i> , <i>Lepyrodia scariosa</i> , <i>Chordifex fastigiatus</i>
S137aT3Q4S19	M1	1.4	4	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.4	5	<i>Leptocarpus tenax</i> , <i>Cyathochaeta diandra</i>
S137aT3Q5S19	M1	0.7	2.3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>
	L1	0	1	5	<i>Chordifex fastigiatus</i> , <i>Ptilothrix deusta</i>
S137aT3Q6S19	M1	1	1.8	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i>
	L1	0	1.3	5	<i>Chordifex fastigiatus</i> , <i>Cyathochaeta diandra</i> , <i>Lepyrodia scariosa</i>
S137aT3Q7S19	M1	0.5	2	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.5	5	<i>Chordifex fastigiatus</i> , <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.

Upland Swamp monitoring sites – Spring 2019

Swamp 137b – 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					
S137bT1Q1S19	M1	0.8	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.4	10	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i>
S137bT1Q2S19	M1	0.3	2.4	65	<i>Petrophile pulchella</i> , <i>Hakea teretifolia</i>
	L1	0	0.7	15	<i>Lepidosperma neesii</i> , <i>Lepyrodia scariosa</i>
S137bT1Q3S19	M1	0.7	2.5	45	<i>Petrophile pulchella</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.1	5	<i>Lepidosperma neesii</i> , <i>Cyathochaeta diandra</i> , <i>Schoenus brevifolius</i>
S137bT1Q4S19	M1	1	2.5	30	<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>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i>
S137bT1Q5S19	M1	1	2.3	60	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Petrophile pulchella</i> , <i>Leptospermum squarrosum</i>
	L1	0	0.6	15	<i>Lepidosperma neesii</i>
S137bT1Q6S19	M1	1.3	2.8	45	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	0.6	30	<i>Ptilothrix deusta</i> , <i>Lepidosperma neesii</i>
S137bT1Q7S19	M1	1	2.5	40	<i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Chordifex fastigiatus</i> , <i>Lepidosperma neesii</i>
Transect 2					
S137bT2Q1S19	M1	2	5	20	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Petrophile pulchella</i>
	L1	0	1.5	15	<i>Lepidosperma neesii</i> , <i>Cyathochaeta diandra</i>
S137bT2Q2S19	M1	2	4	40	<i>Leptospermum squarrosum</i>
	L1	0	0.6	10	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S137bT2Q3S19	M1	3	4.5	45	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	1	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S137bT2Q4S19	M1	1.9	4.2	70	<i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	10	<i>Lepidosperma neesii</i> , <i>Schoenus brevifolius</i> , <i>Chorizandra cymbaria</i>
S137bT2Q5S19	M1	2.5	4	40	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.2	5	<i>Schoenus brevifolius</i> , <i>Cyathochaeta diandra</i>
S137bT2Q6S19	M1	2	4	30	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.3	25	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S137bT2Q7S19	M1	2	3.5	50	<i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.8	10	<i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>

Upland Swamp monitoring sites – Spring 2019

Swamp 137b – Vegetation structure, dominant species and estimated cover for each stratum

Site Number	Stratum	Lower Height (m)	Upper Height (m)	Percent Cover (%)	Dominant Species
S137bT2Q8S19	M1	1	4	30	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.6	10	<i>Schoenus brevifolius</i>
S137bT2Q9S19	M1	1.5	3.2	65	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i>
	L1	0	1.3	15	<i>Schoenus brevifolius</i> , <i>Lepidosperma neesii</i>
S137bT2Q10S19	M1	1.7	3.5	40	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	2	25	<i>Schoenus brevifolius</i> , <i>Ptilothrix deusta</i>
Transect 3					
S137bT3Q1S19	M1	1.7	3	50	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1.5	15	<i>Cyathochaeta diandra</i> , <i>Lepidosperma neesii</i>
S137bT3Q2S19	M1	1.4	3.7	60	<i>Hakea teretifolia</i> , <i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i>
	L1	0	1	15	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i> , <i>Cyathochaeta diandra</i>
S137bT3Q3S19	M1	2	4	40	<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>Cyathochaeta diandra</i>
S137bT3Q4S19	M1	1.5	3.2	60	<i>Leptospermum squarrosum</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Hakea teretifolia</i>
	L1	0	1.2	15	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</i> , <i>Empodisma minus</i>
S137bT3Q5S19	M1	1.5	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1.4	10	<i>Lepidosperma neesii</i> , <i>Cyathochaeta diandra</i> , <i>Ptilothrix deusta</i>
S137bT3Q6S19	M1	1.5	3	50	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Leptospermum squarrosum</i> , <i>Hakea teretifolia</i>
	L1	0	1	25	<i>Lepidosperma neesii</i> , <i>Ptilothrix deusta</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.

Estimated cover/abundance data

Upland Swamp monitoring sites – Spring 2019

Swamp 40 – Vegetation cover/abundance

Family	Species	Transect 1						Transect 2						Transect 3							
		S40T1Q1S19	S40T1Q2S19	S40T1Q3S19	S40T1Q4S19	S40T1Q5S19	S40T1Q6S19	S40T2Q1S19	S40T2Q2S19	S40T2Q3S19	S40T2Q4S19	S40T2Q5S19	S40T2Q6S19	S40T3Q1S19	S40T3Q2S19	S40T3Q3S19	S40T3Q4S19	S40T3Q5S19	S40T3Q6S19	S40T3Q7S19	S40T3Q8S19
Colchicaceae	<i>Burchardia umbellata</i>	1																			
Cyperaceae	<i>Chorizandra cymbaria</i>	1			1				2					3	2			3	1		
	<i>Lepidosperma filiforme</i>					1															
	<i>Lepidosperma neesii</i>	3	3	3	4	4		2	3	3	2	3	3	3	3	4	3	4	3		
	<i>Ptilothrix deusta</i>	2	3	3	3		3	1	3	2		1	4	3	3	4	2	3	3	2	4
	<i>Schoenus brevifolius</i>		3	1		3	3	1		3	3	3		3	3	4	3	4	3	3	
Ericaceae	<i>Epacris obtusifolia</i>	1	1	1	3	1					1				1			1		1	1
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>					1							1					1		1	1
Lauraceae	<i>Cassytha glabella</i>	2			1							1		1		2				1	1
Lindsaeaceae	<i>Lindsaea linearis</i>												1	2	1	3	1	3	2		
Myrtaceae	<i>Baeckea imbricata</i>					4	5		1												
	<i>Callistemon citrinus</i>	3	1		1	1			1												
	<i>Leptospermum juniperinum</i>							3	3	1	5	4		4		1		4	4		
	<i>Leptospermum squarrosum</i>	3		4	4	4	4							1	4	1			4	4	3
Poaceae	<i>Entolasia stricta</i>											1	3		3			2			
	<i>Tetrarrhena turfosa</i>										2										
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	3	4	5	5	5	5	5	1	4	3	3	2	5	4	4	4	5	5	2	4
	<i>Banksia oblongifolia</i>													1							
	<i>Banksia robur</i>											1									
	<i>Hakea teretifolia</i>	2	5	4	2	4	4	4	4	5		4	4	4	3	3	4			2	3
	<i>Persoonia pinifolia</i>																		4		
Restionaceae	<i>Chordifex fastigiatus</i>					4	4														3
	<i>Empodisma minus</i>		3	1	2			2	2	3	2	3	2	1	2	2	2	2		2	3
	<i>Leptocarpus tenax</i>	1	1	1						2		1		2		1		2			1
	<i>Lepyrodia scariosa</i>														2		2				
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>												3			1					
Total		11	9	9	10	11	7	7	9	8	7	11	9	13	12	12	8	12	9	9	10

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%

Upland Swamp monitoring sites – Spring 2019
Swamp 41 – Vegetation cover/abundance

		Transect 1							Transect 2							Transect 3																			
Family	Species	S41T1Q1S19	S41T1Q2S19	S41T1Q3S19	S41T1Q4S19	S41T1Q5S19	S41T1Q6S19	S41T1Q7S19	S41T2Q1S19	S41T2Q2S19	S41T2Q3S19	S41T2Q4S19	S41T2Q5S19	S41T2Q6S19	S41T2Q7S19	S41T2Q8S19	S41T2Q9S19	S41T2Q10S19	S41T3Q1S19	S41T3Q2S19	S41T3Q3S19	S41T3Q4S19	S41T3Q5S19	S41T3Q6S19	S41T3Q7S19	S41T3Q8S19	S41T3Q9S19	S41T3Q10S19	S41T3Q11S19	S41T3Q12S19	S41T3Q13S19	S41T3Q14S19	S41T3Q15S19	S41T3Q16S19	
Apiaceae	<i>Actinotus minor</i>																																		
Casuarinaceae	<i>Allocasuarina distyla</i>										4											1						1		3					
Coldchiaceae	<i>Burchardia umbellata</i>																													2			1		
	<i>Chorizandra cymbaria</i>																											1			1	1			
	<i>Cyathochaeta diandra</i>	4	2					1	4	1		1				1				1		3			4		2								
	<i>Lepidosperma neesii</i>			1			2	3	3	2	3					3	2	3	3	1		3		3		3	3	4	4	3	3	3	4	3	3
	<i>Ptilothrix deusta</i>	3	2	2	1	3		3	3	3	3	2	1	2	3	3	2	2	3	3	3	3	3	2	3	4	4	3	4	4	4	3	4	4	3
	<i>Schoenus brevifolius</i>											1	1	1	2	3		1	2		1			3	1	1		3		1	2				1
Dilleniaceae	<i>Hibbertia serpyllifolia</i>										1																								
Droseraceae	<i>Drosera peltata</i>															1																			
Ericaceae	<i>Epacris obtusifolia</i>			1																															
Gleicheniaceae	<i>Gleichenia microphylla</i>									2																									
Goodeniaceae	<i>Dampiera stricta</i>																															2			
Iridaceae	<i>Patersonia sericea</i>																									1				1	1				
Lauraceae	<i>Cassyltha glabella</i>																									1	1		1		1				
Lindsaeaceae	<i>Lindsaea linearis</i>	3									2						1	1			3			2	3	1			2	1					
Lomandraceae	<i>Lomandra obliqua</i>								3										1																
	<i>Lomandra</i> sp.										1						2																		
Myrtaceae	<i>Corymbia gummitera</i>	4								4																									
	<i>Leptospermum grandifolium</i>																												1						
	<i>Leptospermum juniperinum</i>																											4							
	<i>Leptospermum polygalifolium</i>																															4			
	<i>Leptospermum squarrosus</i>	3	4	1	5	6		4			4			2		5	1	4	5	4	4	5	3	4	1	5	4	4	5		5	1	2	5	
	<i>Leptospermum trinervium</i>									3																				1					
Poaceae	<i>Anisopogon avenaceus</i>								4	2																	1								
	<i>Entolasia stricta</i>					2	1	1	1	3											1		1		1			1	1	2				2	
	<i>Tetranthera turfosa</i>									1																									
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5	5	4	4	5	5	1	6	6	5	4	6	5	3	4	5	3	5	5	4	5	6	2	5	5	2	6	6	5	5	6	
	<i>Banksia oblongifolia</i>																												2						
	<i>Hakea dactyloides</i>	1																																	
	<i>Hakea laevipes</i>								4																										
	<i>Hakea teretifolia</i>		5	1			1		4	1		1	4		1		2	5			4		3		3	1		3							
	<i>Lambertia formosa</i>								1																										
	<i>Lomatia silaifolia</i>								1																										
	<i>Persoonia pinifolia</i>										1							1														4			
	<i>Petrophile pulchella</i>																								2										
Restionaceae	<i>Empodisma minus</i>		1				1	1	2	5							2										1	1	2	3			2		
	<i>Leptocarpus tenax</i>										1														2	2	4	2	2				1		
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>																1	1	1																
	<i>Xanthorrhoea</i> sp.	1		2	4				1		4	2	2	2								5		4			1		1	4	3		1		
	Total	8	6	7	4	4	5	7	13	12	11	6	5	5	4	7	10	8	8	4	8	5	6	7	10	13	11	11	12	10	8	11	6	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%

Upland Swamp monitoring sites – Spring 2019

Swamp 46* – Vegetation cover/abundance

		Transect 1					Transect 2					Transect 3						
Family	Species	S46T1Q1S19	S46T1Q2S19	S46T1Q3S19	S46T1Q4S19	S46T1Q5S19	S46T2Q1S19	S46T2Q2S19	S46T2Q3S19	S46T2Q4S19	S46T2Q5S19	S46T3Q1S19	S46T3Q2S19	S46T3Q3S19	S46T3Q4S19	S46T3Q5S19	S46T3Q6S19	S46T3Q7S19
Apiaceae	<i>Actinotus minor</i>	4	1	3	1	3												1
	<i>Xanthosia tridentata</i>		1	1	1	1												
Casuarinaceae	<i>Allocasuarina distyla</i>	5		3				5	2	4								
	<i>Allocasuarina littoralis</i>						4							1				
Colchicaceae	<i>Burchardia umbellata</i>		2	1														
Cyperaceae	<i>Cyathochaeta diandra</i>	1			2		2					3	1	3	2	1	2	
	<i>Lepidosperma filiforme</i>									5	4							
	<i>Lepidosperma limicola</i>									1	1							
	<i>Lepidosperma neesii</i>	3	1	2		2			2					2				
	<i>Ptilothrix deusta</i>	3	3	4	3	3	3	4	4	2		3	3	4	3	3	3	3
	<i>Schoenus brevifolius</i>			2	3	2		3	4					2	2			3
	<i>Schoenus ericetorum</i>	1																
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	1					1											
Droseraceae	<i>Drosera peltata</i>		1	1	1	1				1								
	<i>Drosera spatulata</i>					1												
Ericaceae	<i>Epacris microphylla</i>									4	3							
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	1																
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>				1													
	<i>Dillwynia retorta</i>				1													
	<i>Gompholobium glabratum</i>				1	1												
	++ <i>Pultenaea aristata</i> ▲2V		1	2		3												
Goodeniaceae	<i>Dampiera stricta</i>		1	2	1													
	<i>Goodenia hederacea</i>					2												
	<i>Goodenia heterophylla</i>			2	2													
Haloragaceae	<i>Gonocarpus tetragynus</i>	1	1															
Lauraceae	<i>Cassytha glabella</i>					1												
Lindsaeaceae	<i>Lindsaea linearis</i>	2	1												1			1

Upland Swamp monitoring sites – Spring 2019

Swamp 46* – Vegetation cover/abundance

		Transect 1					Transect 2					Transect 3						
Family	Species	S46T1Q1S19	S46T1Q2S19	S46T1Q3S19	S46T1Q4S19	S46T1Q5S19	S46T2Q1S19	S46T2Q2S19	S46T2Q3S19	S46T2Q4S19	S46T2Q5S19	S46T3Q1S19	S46T3Q2S19	S46T3Q3S19	S46T3Q4S19	S46T3Q5S19	S46T3Q6S19	S46T3Q7S19
Lomandraceae	<i>Lomandra filiformis</i>	1																
	<i>Lomandra obliqua</i>	3	1															
Myrtaceae	<i>Baeckea imbricata</i>				1	1				1								
	<i>Corymbia gummifera</i>	4													4			
	<i>Darwinia fascicularis</i>									1	3							
	<i>Leptospermum arachnoides</i>					1				1								
	<i>Leptospermum squarrosus</i>			1	1	2		4	1	4	2		4	1	4	4		4
	<i>Leptospermum trinervium</i>	2	1															
	<i>Micromyrtus ciliata</i>					1												
Orchidaceae	<i>Orchidaceae indeterminate</i>						1											
Poaceae	<i>Anisopogon avenaceus</i>	1										3				1	2	
	<i>Entolasia stricta</i>	2	2	1			1		1			3		1			2	
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	4	2		2	4	4	5	5	4	5	5	5	4	5	5	5
	<i>Banksia oblongifolia</i>	1	1															
	<i>Hakea dactyloides</i>	1																
	<i>Hakea gibbosa</i>			2														
	<i>Hakea teretifolia</i>						5		2	4	1							4
	<i>Isopogon anemonifolius</i>	4																
	<i>Lambertia formosa</i>																	4
Restionaceae	<i>Petrophile pulchella</i>			2	1									1				
	<i>Chordifex fastigiatus</i>							4	2	4	2							4
	<i>Empodisma minus</i>		2														1	1
	<i>Leptocarpus tenax</i>	4	4		2	3	1							2			1	1
	<i>Lepyrodia scariosa</i>	2	4	4	1	3	2	4	2	3								3
Selaginellaceae	<i>Selaginella uliginosa</i>	1																
Stylidiaceae	<i>Stylidium lineare</i>	1				1		1										
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	1	4	1	5	6	4	1				4	4	2	4	3	1	2

Upland Swamp monitoring sites – Spring 2019

Swamp 46* – Vegetation cover/abundance

		Transect 1					Transect 2					Transect 3						
Family	Species	S46T1Q1S19	S46T1Q2S19	S46T1Q3S19	S46T1Q4S19	S46T1Q5S19	S46T2Q1S19	S46T2Q2S19	S46T2Q3S19	S46T2Q4S19	S46T2Q5S19	S46T3Q1S19	S46T3Q2S19	S46T3Q3S19	S46T3Q4S19	S46T3Q5S19	S46T3Q6S19	S46T3Q7S19
		Total	25	19	18	17	20	11	9	10	14	8	6	5	11	8	6	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
 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)

* portions of Swamp 46 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey

Upland Swamp monitoring sites – Spring 2019

Swamp 51/52* – Vegetation cover/abundance

Family	Species	Transect 1								Transect 2								Transect 3							
		S51/52T1Q1S19	S51/52T1Q2S19	S51/52T1Q3S19	S51/52T1Q4S19	S51/52T1Q5S19	S51/52T1Q6S19	S51/52T1Q7S19	S51/52T1Q8S19	S51/52T2Q1S19	S51/52T2Q2S19	S51/52T2Q3S19	S51/52T2Q4S19	S51/52T2Q5S19	S51/52T2Q6S19	S51/52T2Q7S19	S51/52T2Q8S19	S51/52T2Q9S19	S51/52T3Q1S19	S51/52T3Q2S19	S51/52T3Q3S19	S51/52T3Q4S19	S51/52T3Q5S19	S51/52T3Q6S19	S51/52T3Q7S19
Apiaceae	<i>Actinotus minor</i>				2			1								1		2							
Casuarinaceae	<i>Allocasuarina littoralis</i>									4						1	1		4						1
Colchicaceae	<i>Burchardia umbellata</i>					1				1									1					1	2
Cunoniaceae	<i>Bauera microphylla</i>																1								
Cyperaceae	<i>Chorizandra cymbaria</i>					2																			1
	<i>Lepidosperma filiforme</i>														1										
	<i>Lepidosperma neesii</i>	2	1	2	2			3			1	3	3	3	3		3	4	2	2	2		2	1	1
	<i>Ptilothrix deusta</i>	3	2	2	3	4	3	3	3			3	4	4	3	4	3		4	3	3	2	3	2	4
	<i>Schoenus brevifolius</i>			1	1		2	3	3	1			2	2	1	2	2		1		1	1	2		
Droseraceae	<i>Drosera peltata</i>					1	3	1	1																
	<i>Drosera spatulata</i>					1	1	1																	
Ericaceae	<i>Epacris obtusifolia</i>						1								1			3							
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>															1		1							
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>																	1							
Goodeniaceae	<i>Dampiera stricta</i>															2									
	<i>Goodenia bellidifolia</i>					1	1	1																	
Haloragaceae	<i>Gonocarpus tetragynus</i>				1			1																	
Lauraceae	<i>Cassytha glabella</i>					1																			
Lomandraceae	<i>Lomandra filiformis</i>						1																		
	<i>Lomandra obliqua</i>																		2						
Myrtaceae	<i>Leptospermum squarrosum</i>			5	1	2	2	2	4		1	4	4	4	4	4	4	4	4			4		4	
Poaceae	<i>Anisopogon avenaceus</i>						1																		
	<i>Entolasia stricta</i>				1		1	2		1								1	3	3	2			1	1
	<i>Tetrarrhena turfosa</i>													1											

Upland Swamp monitoring sites – Spring 2019

Swamp 51/52* – Vegetation cover/abundance

Family	Species	Transect 1								Transect 2								Transect 3							
		S51/52T1Q1S19	S51/52T1Q2S19	S51/52T1Q3S19	S51/52T1Q4S19	S51/52T1Q5S19	S51/52T1Q6S19	S51/52T1Q7S19	S51/52T1Q8S19	S51/52T2Q1S19	S51/52T2Q2S19	S51/52T2Q3S19	S51/52T2Q4S19	S51/52T2Q5S19	S51/52T2Q6S19	S51/52T2Q7S19	S51/52T2Q8S19	S51/52T2Q9S19	S51/52T3Q1S19	S51/52T3Q2S19	S51/52T3Q3S19	S51/52T3Q4S19	S51/52T3Q5S19	S51/52T3Q6S19	S51/52T3Q7S19
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	1	1				2	6	4	4	5	5	3	4	2	4	3	5	4	5	5	5	5	4
	<i>Hakea teretifolia</i>	1	6										1	1	1	3	1	2		1	2	4			
Restionaceae	<i>Chordifex fastigiatus</i>						3		4																
	<i>Empodisma minus</i>													3	4	3		2	1	3				1	
	<i>Leptocarpus tenax</i>					1								2	1										
	<i>Lepyrodia scariosa</i>					2		3	2					2	1	2	4	3							
Selaginellaceae	<i>Selaginella uliginosa</i>					1																			
Stylidiaceae	<i>Stylidium lineare</i>					3	1																		
Xanthorrhoeaceae	<i>Xanthorrhoea</i> sp.	2		3	3	4		4				1		2	1				1	2	4		2	4	4
Total		5	4	6	8	13	12	13	7	5	3	5	6	11	12	11	9	11	11	7	7	5	5	8	8

Cover Abundance Scale (Modified Braun Blanquet)

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

* portions of Swamp 51/52 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey

Upland Swamp monitoring sites – Spring 2019

Swamp 53 – Vegetation condition

		Transect 1				Transect 2												Transect 3								
Family	Species	S53T1Q1S19	S53T1Q2S19	S53T1Q3S19	S53T1Q4S19	S53T2Q1S19	S53T2Q2S19	S53T2Q3S19	S53T2Q4S19	S53T2Q5S19	S53T2Q6S19	S53T2Q7S19	S53T2Q8S19	S53T2Q9S19	S53T2Q10S19	S53T2Q11S19	S53T2Q12S19	S53T2Q13S19	S53T3Q1S19	S53T3Q2S19	S53T3Q3S19	S53T3Q4S19	S53T3Q5S19	S53T3Q6S19	S53T3Q7S19	S53T3Q8S19
Casuarinaceae	<i>Allocasuarina distyla</i>															5	5	5								
	<i>Allocasuarina littoralis</i>	5			5												5									
Colchicaceae	<i>Burchardia umbellata</i>			5															5							
Cyperaceae	<i>Lepidosperma filiforme</i>														4	5										
	<i>Lepidosperma neesii</i>					5	5	5	5	5	5		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			5		5	5	5
	<i>Schoenus brevifolius</i>					5	5		5	5		5	5	5	5			5			5	5	5		5	5
Droseraceae	<i>Drosera peltata</i>				5																					
Ericaceae	<i>Epacris obtusifolia</i>			5	5											5										
Fabaceae (Faboideae)	<i>Mirbelia rubiifolia</i>			5																						
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>		5																							
Lauraceae	<i>Cassytha glabella</i>				5																					
Lindsaeaceae	<i>Lindsaea linearis</i>	5		5																						
Myrtaceae	<i>Baeckea imbricata</i>			5																						
	<i>Leptospermum squarrosum</i>	5	5	5	5		5	3	3	5	5	2		5	4	5	5	5	3	3	5	5		5	5	5
Poaceae	<i>Entolasia stricta</i>								5			5												5		
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	4	5	5	5	3	3	5	5	2	5	5	3	5	5	5	3	3	5	5	5	5	5	5
	<i>Hakea teretifolia</i>	5	2	3	5		5						5	5												
	<i>Persoonia pinifolia</i>								5																	
	<i>Petrophile pulchella</i>	5																								
Restionaceae	<i>Chordifex fastigiatus</i>				5													5								
	<i>Empodisma minus</i>	5	4	5																						5
	<i>Leptocarpus tenax</i>			5														5								
	<i>Lepyrodia scariosa</i>				5										5	5	5	5								5
Xanthorrhoeaceae	<i>Xanthorrhoea</i> sp.	5	5	5			5	5		5	5	5							5	5	5	5		5		

Upland Swamp monitoring sites – Spring 2019

Swamp 53 – Vegetation condition

		Transect 1				Transect 2												Transect 3								
Family	Species	S53T1Q1S19	S53T1Q2S19	S53T1Q3S19	S53T1Q4S19	S53T2Q1S19	S53T2Q2S19	S53T2Q3S19	S53T2Q4S19	S53T2Q5S19	S53T2Q6S19	S53T2Q7S19	S53T2Q8S19	S53T2Q9S19	S53T2Q10S19	S53T2Q11S19	S53T2Q12S19	S53T2Q13S19	S53T3Q1S19	S53T3Q2S19	S53T3Q3S19	S53T3Q4S19	S53T3Q5S19	S53T3Q6S19	S53T3Q7S19	S53T3Q8S19
		9	7	12	10	4	7	4	6	5	5	6	5	6	6	7	4	9	6	3	5	6	4	5	5	7
	Total	9	7	12	10	4	7	4	6	5	5	6	5	6	6	7	4	9	6	3	5	6	4	5	5	7

Cover Abundance Scale (Modified Braun Blanquet)

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 5 = cover of 21-50% of site
 6 = cover of 51-75% of site
 7 = cover of greater than 75%

Upland Swamp monitoring sites – Spring 2019

Swamp 101 – Vegetation cover/abundance

		Transect 1										Transect 2										Transect 3										
Family	Species	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		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	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											

Upland 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

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- 1 = cover less than 5% of site and rare
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▲ **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)

Upland Swamp monitoring sites – Spring 2019

Swamp 135 – Vegetation cover/abundance

Family	Species	Transect 1					Transect 2							Transect 3				
		S135T1Q1S19	S135T1Q2S19	S135T1Q3S19	S135T1Q4S19	S135T1Q5S19	S135T2Q1S19	S135T2Q2S19	S135T2Q3S19	S135T2Q4S19	S135T2Q5S19	S135T2Q6S19	S135T2Q7S19	S135T3Q1S19	S135T3Q2S19	S135T3Q3S19	S135T3Q4S19	S135T3Q5S19
Apiaceae	<i>Actinotus minor</i>	2					1							2	2			
Casuarinaceae	<i>Allocasuarina littoralis</i>									1								
Colchicaceae	<i>Burchardia umbellata</i>														1			
Cunoniaceae	<i>Bauera microphylla</i>						3									1		
Cyperaceae	<i>Cyathochaeta diandra</i>	4	4		1	3	4	1	3	1	3					3		
	<i>Lepidosperma neesii</i>	2	4	2	3	2	3	3	3	2	3	3	4	3	4	3	3	
	<i>Ptilothrix deusta</i>	4	3			2	3	3	2	2	3	3	3	3	3	3	2	2
	<i>Schoenus brevifolius</i>		3	2	1			2		1	2	3	3	2	3		3	2
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	2																
Droseraceae	<i>Drosera peltata</i>																	1
Ericaceae	<i>Epacris microphylla</i>						4	1						4	3	1		
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	3	3	1		2	3	1		1	2	2	2				4	
	<i>Mirbelia rubiifolia</i>															1		
	++ <i>Pultenaea aristata</i> ▲2V															1		
	<i>Sphaerolobium vimineum</i>										1							
Goodeniaceae	<i>Dampiera stricta</i>	1						1										
Lauraceae	<i>Cassytha glabella</i>	1						1	1			2	2		1	1		
Lindsaeaceae	<i>Lindsaea linearis</i>														1			
Myrtaceae	<i>Baeckea imbricata</i>						1				1	3	2		1		3	1
	<i>Callistemon citrinus</i>																1	
	<i>Leptospermum arachnoides</i>	1																
	<i>Leptospermum squarrosus</i>	3	4	4	4	4	4	4	5	4	5	4	4	3	2	4	4	1
	<i>Micromyrtus ciliata</i>						3							3	3			
Poaceae	<i>Entolasia stricta</i>								1						2	1		
	<i>Tetrarrhena turfosa</i>	1																
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	3	6	5	5	4	5	4	5	4	5	5	5	5	5	4	5	

Upland Swamp monitoring sites – Spring 2019

Swamp 135 – Vegetation cover/abundance

Family	Species	Transect 1					Transect 2							Transect 3				
		S135T1Q1S19	S135T1Q2S19	S135T1Q3S19	S135T1Q4S19	S135T1Q5S19	S135T2Q1S19	S135T2Q2S19	S135T2Q3S19	S135T2Q4S19	S135T2Q5S19	S135T2Q6S19	S135T2Q7S19	S135T3Q1S19	S135T3Q2S19	S135T3Q3S19	S135T3Q4S19	S135T3Q5S19
	<i>Banksia oblongifolia</i>						1											
	<i>Banksia serrata</i>	1																
	<i>Hakea gibbosa</i>	2		1			3		1	4	3							
	<i>Hakea teretifolia</i>	4	4		4	3	4	2		4	4	4	4	4		4	4	3
	<i>Persoonia pinifolia</i>					1												
	<i>Petrophile pulchella</i>	4	4	4	1	3	5	3	3	4	3			4	5	4	4	
Restionaceae	<i>Chordifex fastigiatus</i>	3	3				2	1	1				2		2		3	
	<i>Empodisma minus</i>	3												1				
	<i>Leptocarpus tenax</i>	3				2	3	1		2	2	1		1	1	3	2	
	<i>Lepyrodia scariosa</i>	3		2		2		1	3	1			2	3	2		4	3
Stylidiaceae	<i>Stylidium lineare</i>														1			
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>					3	1		2	1			2	4	4		1	
Total		20	10	8	7	12	18	15	12	14	13	10	12	14	19	14	14	7

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)

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – Vegetation cover/abundance

		Transect 1									Transect 2							Transect 3							
Family	Species	S136T1Q1S19	S136T1Q2S19	S136T1Q3S19	S136T1Q4S19	S136T1Q5S19	S136T1Q6S19	S136T1Q7S19	S136T1Q8S19	S136T1Q9S19	S136T2Q1S19	S136T2Q2S19	S136T2Q3S19	S136T2Q4S19	S136T2Q5S19	S136T2Q6S19	S136T2Q7S19	S136T3Q1S19	S136T3Q2S19	S136T3Q3S19	S136T3Q4S19	S136T3Q5S19	S136T3Q6S19	S136T3Q7S19	S136T3Q8S19
Anthericaceae	<i>Thysanotus juncifolius</i>			1																					
Apiaceae	<i>Actinotus minor</i>	1						2			2								2	3	1				2
	<i>Platysace linearifolia</i>	2																							
	<i>Xanthosia tridentata</i>									1										1					2
Casuarinaceae	<i>Allocasuarina littoralis</i>								2																
Cunoniaceae	<i>Bauera microphylla</i>	2						1	3										2	2	4	1		2	
Cyperaceae	<i>Cyathochaeta diandra</i>	4	3	3				3	2	3	3	2	2						3	3		1			3
	<i>Lepidosperma neesii</i>	3	2	3	4	4	4	4	3		4	3	4	3	3	4	1	3	1	3		3	5	3	3
	<i>Ptilothrix deusta</i>	4	4	4	3	3	4	3	3	3	4	3	3	3	4	4		3	3	3	3	3	3	3	4
	<i>Schoenus brevifolius</i>					1	1	3				1	4	2	2	3		2	2		3	3	4	3	
Dilleniaceae	<i>Hibbertia riparia</i>								2	2	1							1	3						3
	<i>Hibbertia serpyllifolia</i>	2									1								1	2					
Droseraceae	<i>Drosera peltata</i>									2									1	1					
Ericaceae	<i>Epacris microphylla</i>	4	3								3	2						1	3	2	1				3
	<i>Epacris obtusifolia</i>																							2	
	<i>Leucopogon esquamatus</i>										1									2					
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>																			1					
	<i>Sprengelia incarnata</i>					1																			
Euphorbiaceae	<i>Micrantheum ericoides</i>																		1						
Fabaceae (Faboideae)	<i>Gompholobium glabratum</i>									1									1						
	++ <i>Pultenaea aristata</i> ▲2V		1								2								1						
Fabaceae (Mimosoideae)	<i>Acacia</i> sp.									1															
Goodeniaceae	<i>Dampiera stricta</i>	1							2	1	1		1					1	2	2	1	1	1	1	2
Iridaceae	<i>Patersonia sericea</i>									1															1
Lauraceae	<i>Cassytha glabella</i>	1	1	1			1			1		1						1	1	1	1				

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – Vegetation cover/abundance

		Transect 1									Transect 2							Transect 3							
Family	Species	S136T1Q1S19	S136T1Q2S19	S136T1Q3S19	S136T1Q4S19	S136T1Q5S19	S136T1Q6S19	S136T1Q7S19	S136T1Q8S19	S136T1Q9S19	S136T2Q1S19	S136T2Q2S19	S136T2Q3S19	S136T2Q4S19	S136T2Q5S19	S136T2Q6S19	S136T2Q7S19	S136T3Q1S19	S136T3Q2S19	S136T3Q3S19	S136T3Q4S19	S136T3Q5S19	S136T3Q6S19	S136T3Q7S19	S136T3Q8S19
Lindsaeaceae	Lindsaea linearis		2						2	3	1				1			2		2	2	2	1		2
Lomandraceae	Lomandra obliqua	2								1															
Myrtaceae	Baeckea imbricata									1		2						1	1	2	2		3	2	
	Corymbia gummifera	5																							
	Darwinia diminuta ▲2RCi																		2						
	Leptospermum arachnoides									1	2									1					
	Leptospermum squarrosum	4	5	5	4	4	3	4	3		3	3	5	3	4	5	4	4	4	3	4	4	4	4	4
	Leptospermum trinervium																								2
	Micromyrtus ciliata												1												
Poaceae	Anisopogon avenaceus									3															3
	Entolasia stricta	1		2		1		1									1			1	2	1			
	Tetrarrhena turfosa	1																							
Proteaceae	Banksia ericifolia subsp. ericifolia	4	4	4	3	4	4	4	4	3	5	4	5	4	3	4	3	5		4	4	4	4	5	4
	Banksia oblongifolia									1			1							1					
	Grevillea oleoides											1													
	Hakea teretifolia	4	2	4	2	4	3	4		2	3			1	3	5		1	1	1	1	1	1	1	2
	Lomatia silaifolia									1															
	Petrophile pulchella	1	2						3	2	4	4			2			4	4	4	4	4	3	3	4
	Petrophile sessilis	1																							
Restionaceae	Baloskion gracile										1														
	Chordifex dimorphus																		1						
	Chordifex fastigiatus																							3	3
	Empodisma minus			1			1									2	2							1	
	Leptocarpus tenax		1						1		1	3	2		2			1	2	2	2		1		
	Lepyrodia scariosa	4	2	2	2		1	3	2	2	4	2	4				1	3	1		4		1	3	3

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – Vegetation cover/abundance

		Transect 1									Transect 2							Transect 3							
Family	Species	S136T1Q1S19	S136T1Q2S19	S136T1Q3S19	S136T1Q4S19	S136T1Q5S19	S136T1Q6S19	S136T1Q7S19	S136T1Q8S19	S136T1Q9S19	S136T2Q1S19	S136T2Q2S19	S136T2Q3S19	S136T2Q4S19	S136T2Q5S19	S136T2Q6S19	S136T2Q7S19	S136T3Q1S19	S136T3Q2S19	S136T3Q3S19	S136T3Q4S19	S136T3Q5S19	S136T3Q6S19	S136T3Q7S19	S136T3Q8S19
Rhamnaceae	<i>Cryptandra ericoides</i>										1														
Schizaeaceae	<i>Schizaea bifida</i>									1															
Stylidiaceae	<i>Stylidium lineare</i>																	2						2	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>		1							1									1						
	Total	20	14	11	6	8	9	11	13	23	20	13	11	6	9	7	6	16	24	23	16	12	12	15	18

Cover Abundance Scale (Modified Braun Blanquet)

- 1 = cover less than 5% of site and rare
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 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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Upland Swamp monitoring sites – Spring 2019

Swamp 137a – Vegetation cover/abundance

		Transect 1									Transect 2						Transect 3						
Family	Species	S137aT1Q1S19	S137aT1Q2S19	S137aT1Q3S19	S137aT1Q4S19	S137aT1Q5S19	S137aT1Q6S19	S137aT1Q7S19	S137aT1Q8S19	S137aT1Q9S19	S137aT2Q1S19	S137aT2Q2S19	S137aT2Q3S19	S137aT2Q4S19	S137aT2Q5S19	S137aT2Q6S19	S137aT3Q1S19	S137aT3Q2S19	S137aT3Q3S19	S137aT3Q4S19	S137aT3Q5S19	S137aT3Q6S19	S137aT3Q7S19
Apiaceae	<i>Actinotus minor</i>	1	1								2	1							1				
Casuarinaceae	<i>Allocasuarina distyla</i>												1										
	<i>Allocasuarina littoralis</i>											5											
Colchicaceae	<i>Burchardia umbellata</i>																		1				
Cunoniaceae	<i>Bauera microphylla</i>																					1	
Cyperaceae	<i>Cyathochaeta diandra</i>	4	3	4							2	4	2				3	2	4	3	2	3	2
	<i>Lepidosperma neesii</i>	3	3	3	3	2	3	3	3	3	2	3	3	3	2	3	3	1	3	3	2		2
	<i>Ptilothrix deusta</i>	3	3	3	3	2	3	3	3	3	3	3	3	3	3	2		3	3	2			2
	<i>Schoenus brevifolius</i>	2	3	3	3	3	3	4	3	3							1	1	1		1	2	1
Dilleniaceae	<i>Hibbertia serpyllifolia</i>		1																				
Droseraceae	<i>Drosera peltata</i>								1														
Ericaceae	<i>Epacris microphylla</i>	3	2	3							2	4	3	1									
	<i>Epacris obtusifolia</i>									2													
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	1																					
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	3	2	2		1			2		3	3	3	1	2		2	2	3	1		3	2
	<i>Mirbelia rubiifolia</i>															1							1
	<i>Pultenaea tuberculata</i>										2	1											
Goodeniaceae	<i>Dampiera stricta</i>		2														1	2	2	3	2		
Iridaceae	<i>Patersonia sericea</i>										2												
Lauraceae	<i>Cassytha glabella</i>		2	1					2	1	1				1		1	1	1	1		1	1
Lindsaeaceae	<i>Lindsaea linearis</i>	1																					
Lomandraceae	<i>Lomandra obliqua</i>										2												
Myrtaceae	<i>Baeckea imbricata</i>			2				1	2				2	2	2	2	3	1	2	2	2	2	2
	<i>Darwinia diminuta</i> ▲2RCi														1								
	<i>Darwinia fascicularis</i>										3					4				3			
	<i>Eucalyptus racemosa</i>														2								

Upland Swamp monitoring sites – Spring 2019

Swamp 137a – Vegetation cover/abundance

		Transect 1									Transect 2						Transect 3						
Family	Species	S137aT1Q1S19	S137aT1Q2S19	S137aT1Q3S19	S137aT1Q4S19	S137aT1Q5S19	S137aT1Q6S19	S137aT1Q7S19	S137aT1Q8S19	S137aT1Q9S19	S137aT2Q1S19	S137aT2Q2S19	S137aT2Q3S19	S137aT2Q4S19	S137aT2Q5S19	S137aT2Q6S19	S137aT3Q1S19	S137aT3Q2S19	S137aT3Q3S19	S137aT3Q4S19	S137aT3Q5S19	S137aT3Q6S19	S137aT3Q7S19
	<i>Kunzea capitata</i>															4							
	<i>Leptospermum arachnoides</i>										1	1	1									1	
	<i>Leptospermum squarrosum</i>	4	5	4	4	4	5	4	5	4	2	3	4	5	3	5	4	3	3	4	3	5	4
	<i>Leptospermum trinervium</i>										1	1											
	<i>Micromyrtus ciliata</i>										1												
Poaceae	<i>Anisopogon avenaceus</i>										2												
	<i>Entolasia stricta</i>					1										1							
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	2	5	6	5	5	4	4	5	2	3	1	4	4		4	4	4	4	4	5	4
	<i>Banksia oblongifolia</i>																1		2				
	<i>Grevillea oleoides</i>																1						
	<i>Hakea dactyloides</i>											4											
	<i>Hakea gibbosa</i>		4	2		1	1	1					1				1						
	<i>Hakea teretifolia</i>	4	5	3	4	3	4	5	5	3	3	4		4	2		4	3	4	4	2	4	2
	<i>Isopogon anethifolius</i>	3	4																				
	<i>Persoonia levis</i>																			1			
	<i>Persoonia pinifolia</i>									5										1			
	<i>Petrophile pulchella</i>	1	1	2	1		1				3	4	5	3				4	3	4	4	4	4
Restionaceae	<i>Chordifex fastigiatus</i>	2	3		2		2	1	3	2	4		3		3			3	4		4	3	4
	<i>Empodisma minus</i>										1												
	<i>Leptocarpus tenax</i>	2	2		2				2	2		4	2	4			3	2	2	3		2	
	<i>Lepyrodia scariosa</i>	3	2					3	2		2	3	3	3	2	3		2	4	2	2	3	2
Stylidiaceae	<i>Stylidium lineare</i>												1					1	2	2			1
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>			4						5	3						1		1	1			
	Total	17	19	14	9	9	9	10	13	12	23	17	16	11	12	9	16	16	21	17	11	14	14

Cover Abundance Scale (Modified Braun Blanquet)

▲ RoTAP species

1 = cover less than 5% of site and rare

2: Geographic range in Australia less than 100 km

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%

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)

Upland Swamp monitoring sites – Spring 2019

Swamp 137b – Vegetation cover/abundance

		Transect 1							Transect 2								Transect 3							
Family	Species	S137bT1Q1S19	S137bT1Q2S19	S137bT1Q3S19	S137bT1Q4S19	S137bT1Q5S19	S137bT1Q6S19	S137bT1Q7S19	S137bT2Q1S19	S137bT2Q2S19	S137bT2Q3S19	S137bT2Q4S19	S137bT2Q5S19	S137bT2Q6S19	S137bT2Q7S19	S137bT2Q8S19	S137bT2Q9S19	S137bT2Q10S19	S137bT3Q1S19	S137bT3Q2S19	S137bT3Q3S19	S137bT3Q4S19	S137bT3Q5S19	S137bT3Q6S19
Casuarinaceae	<i>Allocasuarina distyla</i>		1																	1				
Cyperaceae	<i>Chorizandra cymbaria</i>											3	1	1			2	3						
	<i>Cyathochaeta diandra</i>	4	3	3	3	2	2		4				3						4	3	4		3	1
	<i>Lepidosperma limicola</i>																				1			
	<i>Lepidosperma neesii</i>	3	3	3	4	4	4	3	4	3	3	4	2	3			4		3	3	4	3	4	4
	<i>Ptilothrix deusta</i>	3	2	3	3	2	4	2	3	2	2	2	2		3		3	3	3	3	3	3	3	3
	<i>Schoenus brevifolius</i>		2	3	2	2	1	3	3	4	3	3	3	4	4	4	5	4				2		3
Dilleniaceae	<i>Hibbertia serpyllifolia</i>			2																				
Ericaceae	<i>Epacris obtusifolia</i>					2										1	3	2	1	1		4	3	
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	1	1	2					1			1	1	2	3	1	2		1	1	1	2		
Lauraceae	<i>Cassytha glabella</i>	1		1	1	1	1									1				1		2		1
Myrtaceae	<i>Baeckea imbricata</i>	3	1	2	2			1																
	<i>Darwinia fascicularis</i>					2	1																	
	<i>Leptospermum arachnoides</i>			1																				
	<i>Leptospermum squarrosum</i>	3	3	4	4	4	4	4	5	4	5	5	5	4	5		4	4	5	4	4	4	4	4
Orchidaceae	<i>Cryptostylis erecta</i>						1																	
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	3	4	5	5	5	3	5	3	4	4	4	4	2	4	5	5	4	4	5	4	5	5
	<i>Hakea teretifolia</i>	3	4	3	2	1	4	4	3	1	5	4	3	5	4	4	4	4		4	4	4	4	4
	<i>Petrophile pulchella</i>	3	4	4	4	4	4	3	4	2	1	1		4	3		1		3	4	3	4	3	3
Restionaceae	<i>Chordifex fastigiatus</i>			1				3					1											2
	<i>Empodisma minus</i>			2															3			3	2	
	<i>Leptocarpus tenax</i>											1		1				2	3	2			2	
	<i>Lepyrodia scariosa</i>	3	3	1	3	3	2	1												2		2		5
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>			3																				2

Upland Swamp monitoring sites – Spring 2019

Swamp 137b – Vegetation cover/abundance

		Transect 1						Transect 2								Transect 3								
Family	Species	S137bT1Q1S19	S137bT1Q2S19	S137bT1Q3S19	S137bT1Q4S19	S137bT1Q5S19	S137bT1Q6S19	S137bT1Q7S19	S137bT2Q1S19	S137bT2Q2S19	S137bT2Q3S19	S137bT2Q4S19	S137bT2Q5S19	S137bT2Q6S19	S137bT2Q7S19	S137bT2Q8S19	S137bT2Q9S19	S137bT2Q10S19	S137bT3Q1S19	S137bT3Q2S19	S137bT3Q3S19	S137bT3Q4S19	S137bT3Q5S19	S137bT3Q6S19
		11	12	17	11	12	12	10	9	7	7	10	10	9	7	6	10	8	10	13	9	12	10	12
Total																								

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

Upland Swamp monitoring sites – Spring 2019

Swamp 40 – Vegetation condition

		Transect 1						Transect 2						Transect 3							
Family	Species	S40T1Q1S19	S40T1Q2S19	S40T1Q3S19	S40T1Q4S19	S40T1Q5S19	S40T1Q6S19	S40T2Q1S19	S40T2Q2S19	S40T2Q3S19	S40T2Q4S19	S40T2Q5S19	S40T2Q6S19	S40T3Q1S19	S40T3Q2S19	S40T3Q3S19	S40T3Q4S19	S40T3Q5S19	S40T3Q6S19	S40T3Q7S19	S40T3Q8S19
Colchicaceae	<i>Burchardia umbellata</i>	5																			
Cyperaceae	<i>Chorizandra cymbaria</i>	5			5				5					5	5			5	5		
	<i>Lepidosperma filiforme</i>					5															
	<i>Lepidosperma neesii</i>	5	5	5	5	5		5	4	5	5	5	4	5	4	5	5	5	5		
	<i>Ptilothrix deusta</i>	5	5	5	5		5	5	5	5		5	5	5	4	5	5	5	5	5	5
	<i>Schoenus brevifolius</i>		5	5		5	5	5		5	5	4		4	4	5	5	4	4	5	
	Ericaceae	<i>Epacris obtusifolia</i>	5	5	5	5	5					5				5			5		5
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>					5							5					5		5	5
Lauraceae	<i>Cassytha glabella</i>	5			5							5		5		5				5	5
Lindsaeaceae	<i>Lindsaea linearis</i>												5	5	5	5	5	5	5		
Myrtaceae	<i>Baeckea imbricata</i>					5	5		5												
	<i>Callistemon citrinus</i>	5	5		5	5			5												
	<i>Leptospermum juniperinum</i>							5	5	5	5	4		5		5		5	5		
	<i>Leptospermum squarrosum</i>	5		5	5	5	5							5	5	5			5	5	5
Poaceae	<i>Entolasia stricta</i>											5	5		5			4			
	<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	5	5	5	5	5	5
	<i>Banksia oblongifolia</i>													5							
	<i>Banksia robur</i>											3									
	<i>Hakea teretifolia</i>	5	5	5	5	4	5	5	5	5		5	5	4	5	5	5			5	5
	<i>Persoonia pinifolia</i>																		5		
Restionaceae	<i>Chordifex fastigiatus</i>					4	4														4
	<i>Empodisma minus</i>		5	5	5			5	5	5	5	5	5	4	5	5	5	5		5	5
	<i>Leptocarpus tenax</i>	5	5	5						5		5		5		5		5			5
	<i>Lepyrodia scariosa</i>														5		5				
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>												4			5					
	Total	11	9	9	10	11	7	7	9	8	7	11	9	13	12	12	8	12	9	9	10

Condition Scale

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

Upland Swamp monitoring sites – Spring 2019
Swamp 41 – Vegetation condition

		Transect1							Transect2									Transect3																			
Family	Species	S41T1Q1S19	S41T1Q2S19	S41T1Q3S19	S41T1Q4S19	S41T1Q5S19	S41T1Q6S19	S41T1Q7S19	S41T2Q10S19	S41T2Q1S19	S41T2Q2S19	S41T2Q3S19	S41T2Q4S19	S41T2Q5S19	S41T2Q6S19	S41T2Q7S19	S41T2Q8S19	S41T2Q9S19	S41T3Q1S19	S41T3Q2S19	S41T3Q3S19	S41T3Q4S19	S41T3Q5S19	S41T3Q6S19	S41T3Q7S19	S41T3Q8S19	S41T3Q9S19	S41T3Q10S19	S41T3Q11S19	S41T3Q12S19	S41T3Q13S19	S41T3Q14S19	S41T3Q15S19	S41T3Q16S19			
Apiaceae	<i>Actinotus minor</i>																										5										
Casuarinaceae	<i>Allocasuarina distyla</i>											5										5					5		5								
Colchicaceae	<i>Burchardia umbellata</i>																													5				5			
	<i>Chorizandra cymbaria</i>																												3			3	5				
	<i>Cyathochaeta diandra</i>	5	5					5		5	5		5				5		5		4			5		5											
	<i>Lepidosperma neesii</i>			4			5	5	5	4	5	5					5	5	5	5				5		5	5	5	5	5	5	5	5	5	5		
	<i>Ptilothrix deusta</i>	5	5	4	5	4		5	5	4	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	5	5	5	4		4		5			4	5	5		4		5	5				5		
Dilleniaceae	<i>Hibbertia serpyllifolia</i>											5																									
Droseraceae	<i>Drosera peltata</i>																5																				
Ericaceae	<i>Epacris obtusifolia</i>			5																																	
Gleicheniaceae	<i>Gleichenia microphylla</i>										5																										
Goodeniaceae	<i>Dampiera stricta</i>																																	5			
Iridaceae	<i>Patersonia sericea</i>																										5				4	5					
Lauraceae	<i>Cassytha glabella</i>																										5	5		5			5				
Lindsaeaceae	<i>Lindsaea linearis</i>	5							5			5						5			5			5	5	5			5	5							
Lomandraceae	<i>Lomandra obliqua</i>									5									5																		
	<i>Lomandra</i> sp.											5						5																			
Myrtaceae	<i>Corymbia gummifera</i>	5									5																										
	<i>Leptospermum grandifolium</i>																												5								
	<i>Leptospermum juniperinum</i>																										5										
	<i>Leptospermum polygalifolium</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	4	5	5		
	<i>Leptospermum trinervium</i>											5																			3						
Poaceae	<i>Anisopogon avenaceus</i>									5	5																5										
	<i>Entolasia stricta</i>					5	5	5		4	5										5		5		5			5	5	5					5		
	<i>Tetarrhena turfosa</i>											5																									
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	5	5	5	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	5	5	5	5	5		
	<i>Banksia oblongifolia</i>																													5							
	<i>Hakea dactyloides</i>	5																																			
	<i>Hakea laevipes</i>																																				
	<i>Hakea teretifolia</i>		5	5			5		5	5	5		5	5			5				5		5		3	2			5								
	<i>Lambertia formosa</i>										4																										
	<i>Lomatia silaifolia</i>										5																										
	<i>Persoonia pinifolia</i>												5						5														5				
	<i>Petrophile pulchella</i>																									5											
	Restionaceae	<i>Empodisma minus</i>		5				3	5		5	4																5	5	5	4	5			5		
<i>Leptocarpus tenax</i>												4														5	5	5	5	5				5			
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>								5									5	5																		
	<i>Xanthorrhoea</i> sp.	5		5	5					5		5	5	5	5							4		5			5		5	5	5			5			
	Total	8	6	7	4	4	5	7	8	13	12	11	6	5	5	4	7	10	8	4	8	5	6	7	10	13	11	11	12	10	8	11	6	6			

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

Upland Swamp monitoring sites – Spring 2019

Swamp 46* – Vegetation condition

		Transect 1					Transect 2					Transect 3						
Family	Species	S46T1Q1S19	S46T1Q2S19	S46T1Q3S19	S46T1Q4S19	S46T1Q5S19	S46T2Q1S19	S46T2Q2S19	S46T2Q3S19	S46T2Q4S19	S46T2Q5S19	S46T3Q1S19	S46T3Q2S19	S46T3Q3S19	S46T3Q4S19	S46T3Q5S19	S46T3Q6S19	S46T3Q7S19
Apiaceae	<i>Actinotus minor</i>	5	5	5	5	5												5
	<i>Xanthosia tridentata</i>		5	5	5	5												
Casuarinaceae	<i>Allocasuarina distyla</i>	5		5				5	5	5								
	<i>Allocasuarina littoralis</i>						5							5				
Colchicaceae	<i>Burchardia umbellata</i>		5	5														
Cyperaceae	<i>Cyathochaeta diandra</i>	5			5		5					5	5	5	5	5	5	
	<i>Lepidosperma filiforme</i>									4	5							
	<i>Lepidosperma limicola</i>									5	5							
	<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
	<i>Schoenus brevifolius</i>			5	5	5		4	5					5	5			5
	<i>Schoenus ericetorum</i>	5																
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	5					5											
Droseraceae	<i>Drosera peltata</i>		5	5	5	5				5								
	<i>Drosera spatulata</i>					5												
Ericaceae	<i>Epacris microphylla</i>									5	5							
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	5																
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>				5													
	<i>Dillwynia retorta</i>				5													
	<i>Gompholobium glabratum</i>				5	5												
	++ <i>Pultenaea aristata</i> ▲2V		5	5		5												
Goodeniaceae	<i>Dampiera stricta</i>		5	5	4													
	<i>Goodenia hederacea</i>					5												
	<i>Goodenia heterophylla</i>			5	5													
Haloragaceae	<i>Gonocarpus tetragynus</i>	5	5															
Lauraceae	<i>Cassytha glabella</i>					5												
Lindsaeaceae	<i>Lindsaea linearis</i>	5	5												4			5

Upland Swamp monitoring sites – Spring 2019

Swamp 46* – Vegetation condition

		Transect 1					Transect 2					Transect 3						
Family	Species	S46T1Q1S19	S46T1Q2S19	S46T1Q3S19	S46T1Q4S19	S46T1Q5S19	S46T2Q1S19	S46T2Q2S19	S46T2Q3S19	S46T2Q4S19	S46T2Q5S19	S46T3Q1S19	S46T3Q2S19	S46T3Q3S19	S46T3Q4S19	S46T3Q5S19	S46T3Q6S19	S46T3Q7S19
Lomandraceae	<i>Lomandra filiformis</i>	5																
	<i>Lomandra obliqua</i>	5	5															
Myrtaceae	<i>Baeckea imbricata</i>				5	5				5								
	<i>Corymbia gummifera</i>	5													5			
	<i>Darwinia fascicularis</i>									5	5							
	<i>Leptospermum arachnoides</i>					5				5								
	<i>Leptospermum squarrosum</i>			5	5	5		5	5	3	5		5	5	5	5		5
	<i>Leptospermum trinervium</i>	5	5															
	<i>Micromyrtus ciliata</i>					5												
	<i>Orchidaceae indeterminate</i>						5											
Poaceae	<i>Anisopogon avenaceus</i>	5										5				5	5	
	<i>Entolasia stricta</i>	5	5	5			5		5			5		5			5	
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5		5	5	5	5	3	5	2	4	4	4	5	2	5
	<i>Banksia oblongifolia</i>	5	3															
	<i>Hakea dactyloides</i>	5																
	<i>Hakea gibbosa</i>			5														
	<i>Hakea teretifolia</i>						5		5	5	5							5
	<i>Isopogon anemonifolius</i>	5																
	<i>Lambertia formosa</i>																	3
	<i>Petrophile pulchella</i>			5	5									5				
Restionaceae	<i>Chordifex fastigiatus</i>							5	5	5	5							5
	<i>Empodisma minus</i>		5														5	5
	<i>Leptocarpus tenax</i>	5	5		5	5	5							5			5	5
	<i>Lepyrodia scariosa</i>	5	5	5	5	5	5	4	5	5								5
Selaginellaceae	<i>Selaginella uliginosa</i>	5																
Stylidiaceae	<i>Stylidium lineare</i>	5				5		5										
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>	5	5	5	5	5	5	5				5	4	5	5	5	5	5

Upland Swamp monitoring sites – Spring 2019

Swamp 46* – Vegetation condition

		Transect 1					Transect 2					Transect 3						
Family	Species	S46T1Q1S19	S46T1Q2S19	S46T1Q3S19	S46T1Q4S19	S46T1Q5S19	S46T2Q1S19	S46T2Q2S19	S46T2Q3S19	S46T2Q4S19	S46T2Q5S19	S46T3Q1S19	S46T3Q2S19	S46T3Q3S19	S46T3Q4S19	S46T3Q5S19	S46T3Q6S19	S46T3Q7S19
Total		25	19	18	17	20	11	9	10	14	8	6	5	11	8	6	8	13

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)

* portions of Swamp 46 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey

Upland Swamp monitoring sites – Spring 2019

Swamp 51/52* – Vegetation condition

Family	Species	Transect 1								Transect 2								Transect 3							
		S51/52T1Q1S19	S51/52T1Q2S19	S51/52T1Q3S19	S51/52T1Q4S19	S51/52T1Q5S19	S51/52T1Q6S19	S51/52T1Q7S19	S51/52T1Q8S19	S51/52T2Q1S19	S51/52T2Q2S19	S51/52T2Q3S19	S51/52T2Q4S19	S51/52T2Q5S19	S51/52T2Q6S19	S51/52T2Q7S19	S51/52T2Q8S19	S51/52T2Q9S19	S51/52T3Q1S19	S51/52T3Q2S19	S51/52T3Q3S19	S51/52T3Q4S19	S51/52T3Q5S19	S51/52T3Q6S19	S51/52T3Q7S19
Apiaceae	<i>Actinotus minor</i>				5			5								5		5							
Casuarinaceae	<i>Allocasuarina littoralis</i>									5						5	3		5						5
Colchicaceae	<i>Burchardia umbellata</i>					5				5									5					5	5
Cunoniaceae	<i>Bauera microphylla</i>																5								
Cyperaceae	<i>Chorizandra cymbaria</i>					5																			5
	<i>Lepidosperma filiforme</i>														4										
	<i>Lepidosperma neesii</i>	5	5	5	5			5			5	4	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	5		5	5	5	5	5	5	5
	<i>Schoenus brevifolius</i>			5	5		5	5	5	3			5	5	4	5	5		4		5	4	5		
Droseraceae	<i>Drosera peltata</i>					5	5	5	5																
	<i>Drosera spatulata</i>					5	5	5																	
Ericaceae	<i>Epacris obtusifolia</i>						5								5			5							
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>															5		5							
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>																	5							
Goodeniaceae	<i>Dampiera stricta</i>															5									
	<i>Goodenia bellidifolia</i>					5	5	5																	
Haloragaceae	<i>Gonocarpus tetragynus</i>				5			5																	
Lauraceae	<i>Cassytha glabella</i>					5																			
Lomandraceae	<i>Lomandra filiformis</i>						5																		
	<i>Lomandra obliqua</i>																		5						
Myrtaceae	<i>Leptospermum squarrosum</i>			5	5	5	5	5	5		5	5	5	5	5	5	5	5	5			5		5	
Poaceae	<i>Anisopogon avenaceus</i>						5																		
	<i>Entolasia stricta</i>				5		5	5		4								5	5	5	5			5	4
	<i>Tetrarrhena turfosa</i>												5												

Upland Swamp monitoring sites – Spring 2019

Swamp 51/52* – Vegetation condition

Family	Species	Transect 1								Transect 2								Transect 3							
		S51/52T1Q1S19	S51/52T1Q2S19	S51/52T1Q3S19	S51/52T1Q4S19	S51/52T1Q5S19	S51/52T1Q6S19	S51/52T1Q7S19	S51/52T1Q8S19	S51/52T2Q1S19	S51/52T2Q2S19	S51/52T2Q3S19	S51/52T2Q4S19	S51/52T2Q5S19	S51/52T2Q6S19	S51/52T2Q7S19	S51/52T2Q8S19	S51/52T2Q9S19	S51/52T3Q1S19	S51/52T3Q2S19	S51/52T3Q3S19	S51/52T3Q4S19	S51/52T3Q5S19	S51/52T3Q6S19	S51/52T3Q7S19
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	3	4				5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	4
	<i>Hakea teretifolia</i>	5	5										5	5	5	5	5	5		5	5	5			
Restionaceae	<i>Chordifex fastigiatus</i>						5		5																
	<i>Empodisma minus</i>													5	5	5		5	4	5				4	
	<i>Leptocarpus tenax</i>					5								5	5										
	<i>Lepyrodia scariosa</i>					5		5	5					5	5	5	5	5							
Selaginellaceae	<i>Selaginella uliginosa</i>					5																			
Stylidiaceae	<i>Stylidium lineare</i>					5	5																		
Xanthorrhoeaceae	<i>Xanthorrhoea</i> sp.	5		5	5	5		4				5		5	5				5	5	5		5	5	5
Total		5	4	6	8	13	12	13	7	5	3	5	6	11	12	11	9	11	11	7	7	5	5	8	8

Condition Scale

1 = severe damage/dieback

2 = many dead stems

3 = some dead branches

4 = minor damage

5 = healthy

* portions of Swamp 51/52 were subject to WaterNSW hazard reduction burns following the autumn 2017 baseline survey

Upland Swamp monitoring sites – Spring 2019

Swamp 53 – Vegetation condition

		Transect 1				Transect 2												Transect 3								
Family	Species	\$53T1Q1S19	\$53T1Q2S19	\$53T1Q3S19	\$53T1Q4S19	\$53T2Q1S19	\$53T2Q2S19	\$53T2Q3S19	\$53T2Q4S19	\$53T2Q5S19	\$53T2Q6S19	\$53T2Q7S19	\$53T2Q8S19	\$53T2Q9S19	\$53T2Q10S19	\$53T2Q11S19	\$53T2Q12S19	\$53T2Q13S19	\$53T3Q1S19	\$53T3Q2S19	\$53T3Q3S19	\$53T3Q4S19	\$53T3Q5S19	\$53T3Q6S19	\$53T3Q7S19	\$53T3Q8S19
Casuarinaceae	<i>Allocasuarina distyla</i>															5	5	5								
	<i>Allocasuarina littoralis</i>	5			5																					
Colchicaceae	<i>Burchardia umbellata</i>			5															5							
Cyperaceae	<i>Lepidosperma filiforme</i>														4	5			5							
	<i>Lepidosperma neesii</i>					5	5	5	5	5	5		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			5		5	5	5
	<i>Schoenus brevifolius</i>					5	5		5	5		5	5	5	5			5			5	5	5		5	5
Droseraceae	<i>Drosera peltata</i>				5																					
Ericaceae	<i>Epacris obtusifolia</i>			5	5											5										
Fabaceae (Faboideae)	<i>Mirbelia rubiifolia</i>			5																						
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>		5																							
Lauraceae	<i>Cassytha glabella</i>				5																					
Lindsaeaceae	<i>Lindsaea linearis</i>	5		5																						
Myrtaceae	<i>Baeckea imbricata</i>			5																						
	<i>Leptospermum squarrosum</i>	5	5	5	5		5	3	3	5	5	2		5	4	5	5	5	3	3	5	5		5	5	5
Poaceae	<i>Entolasia stricta</i>								5			5											5			
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	4	5	5	5	3	3	5	5	2	5	5	3	5	5	5	3	3	5	5	5	5	5	5
	<i>Hakea teretifolia</i>	5	2	3	5		5						5	5												
	<i>Persoonia pinifolia</i>								5																	
	<i>Petrophile pulchella</i>	5																								
Restionaceae	<i>Chordifex fastigiatus</i>				5													5								
	<i>Empodisma minus</i>	5	4	5																						5
	<i>Leptocarpus tenax</i>			5														5								
	<i>Lepyrodia scariosa</i>				5										5	5	5	5								5

Upland Swamp monitoring sites – Spring 2019

Swamp 53 – Vegetation condition

		Transect 1				Transect 2												Transect 3								
Family	Species	S53T1Q1S19	S53T1Q2S19	S53T1Q3S19	S53T1Q4S19	S53T2Q1S19	S53T2Q2S19	S53T2Q3S19	S53T2Q4S19	S53T2Q5S19	S53T2Q6S19	S53T2Q7S19	S53T2Q8S19	S53T2Q9S19	S53T2Q10S19	S53T2Q11S19	S53T2Q12S19	S53T2Q13S19	S53T3Q1S19	S53T3Q2S19	S53T3Q3S19	S53T3Q4S19	S53T3Q5S19	S53T3Q6S19	S53T3Q7S19	S53T3Q8S19
Xanthorrhoeaceae	Xanthorrhoea sp.	5	5	5			5	5		5	5	5							5	5	5	5		5		
Total		9	7	12	10	4	7	4	6	5	5	6	5	6	6	7	4	9	6	3	5	6	4	5	5	7

Condition Scale

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

Upland 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									
	<i>Epacris obtusifolia</i>						5		5				5	5	5	5	5		5	5		5	5	5	5	5	5		5	5	
	<i>Leucopogon esquamatus</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										

Upland 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

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)

Upland Swamp monitoring sites – Spring 2019

Swamp 135 – Vegetation condition

Family	Species	Transect 1						Transect 2						Transect 3				
		S135T1Q1S19	S135T1Q2S19	S135T1Q3S19	S135T1Q4S19	S135T1Q5S19	S135T2Q1S19	S135T2Q2S19	S135T2Q3S19	S135T2Q4S19	S135T2Q5S19	S135T2Q6S19	S135T2Q7S19	S135T3Q1S19	S135T3Q2S19	S135T3Q3S19	S135T3Q4S19	S135T3Q5S19
Apiaceae	<i>Actinotus minor</i>	5					5							5	5			
Casuarinaceae	<i>Allocasuarina littoralis</i>									5								
Colchicaceae	<i>Burchardia umbellata</i>														5			
Cunoniaceae	<i>Bauera microphylla</i>						5									5		
Cyperaceae	<i>Cyathochaeta diandra</i>	4	5		4	5	5	5	4	5	5					4		
	<i>Lepidosperma neesii</i>	5	4	5	4	5	5	5	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	4	5	5
	<i>Schoenus brevifolius</i>		4	5	5			5		5	5	5	4	5	5		4	4
Dilleniaceae	<i>Hibbertia serpyllifolia</i>	5																
Droseraceae	<i>Drosera peltata</i>																	5
Ericaceae	<i>Epacris microphylla</i>						5	5						5	5	5		
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	5	5	5		5	5	5		5	5	5	5				5	
	<i>Mirbelia rubiifolia</i>															5		
	++ <i>Pultenaea aristata</i> ▲2V															5		
	<i>Sphaerolobium vimineum</i>										5							
Goodeniaceae	<i>Dampiera stricta</i>	5						5										
Lauraceae	<i>Cassytha glabella</i>	5						5	5			5	5		5	5		
Lindsaeaceae	<i>Lindsaea lineari</i>														5			
Myrtaceae	<i>Baeckea imbricata</i>						5				5	5	5		5		5	5
	<i>Callistemon citrinus</i>																5	
	<i>Leptospermum arachnoides</i>	5																
	<i>Leptospermum squarrosus</i>	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	<i>Micromyrtus ciliata</i>						5							5	5			
Poaceae	<i>Entolasia stricta</i>								5						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	5	5	

Upland Swamp monitoring sites – Spring 2019

Swamp 135 – Vegetation condition

Family	Species	Transect 1						Transect 2						Transect 3				
		S135T1Q1S19	S135T1Q2S19	S135T1Q3S19	S135T1Q4S19	S135T1Q5S19	S135T2Q1S19	S135T2Q2S19	S135T2Q3S19	S135T2Q4S19	S135T2Q5S19	S135T2Q6S19	S135T2Q7S19	S135T3Q1S19	S135T3Q2S19	S135T3Q3S19	S135T3Q4S19	S135T3Q5S19
	<i>Banksia oblongifolia</i>					5												
	<i>Banksia serrata</i>	5																
	<i>Hakea gibbosa</i>	5		5			5		5	5	5							
	<i>Hakea teretifolia</i>	5	5		5	5	5	5		5	5	5	4	5		5	5	5
	<i>Persoonia pinifolia</i>					5												
	<i>Petrophile pulchella</i>	5	5	5	5	5	5	5	5	5	5			5	4	5	5	
Restionaceae	<i>Chordifex fastigiatus</i>	5	5				5	5	5				5		5		5	
	<i>Empodisma minus</i>	4												5				
	<i>Leptocarpus tenax</i>	5				5	5	5		5	5	5		5	5	5	5	
	<i>Lepyrodia scariosa</i>	5		5		5		5	5	5			5	5	5		5	5
Stylidiaceae	<i>Stylidium lineare</i>														5			
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>					5	5		4	5			5	4	5		5	
Total		20	10	8	7	12	18	15	12	14	13	10	12	14	19	14	14	7

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)

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – Vegetation condition

Family	Species	Transect 1								Transect 2								Transect 3							
		S136T1Q1S19	S136T1Q2S19	S136T1Q3S19	S136T1Q4S19	S136T1Q5S19	S136T1Q6S19	S136T1Q7S19	S136T1Q8S19	S136T1Q9S19	S136T2Q1S19	S136T2Q2S19	S136T2Q3S19	S136T2Q4S19	S136T2Q5S19	S136T2Q6S19	S136T2Q7S19	S136T3Q1S19	S136T3Q2S19	S136T3Q3S19	S136T3Q4S19	S136T3Q5S19	S136T3Q6S19	S136T3Q7S19	S136T3Q8S19
Anthericaceae	<i>Thysanotus juncifolius</i>			5																					
Apiaceae	<i>Actinotus minor</i>	5						5			5								5	5	5				5
	<i>Platysace linearifolia</i>	5																							
	<i>Xanthosia tridentata</i>									5										5					5
Casuarinaceae	<i>Allocasuarina littoralis</i>								5																
Cunoniaceae	<i>Bauera microphylla</i>	5						5	5										5	5	5	5		5	
Cyperaceae	<i>Cyathochaeta diandra</i>	5	5	5				4	4	5	5	5	5						5	5		5			5
	<i>Lepidosperma neesii</i>	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5		5	5	4	5
	<i>Ptilothrix deusta</i>	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		5	5	5	4	5	5	5	5
	<i>Schoenus brevifolius</i>					5	5	5				5	4	5	5	4		5	5		4	5	5	4	
Dilleniaceae	<i>Hibbertia riparia</i>								5	5	5							5	5						5
	<i>Hibbertia serpyllifolia</i>	5									5								5	5					
Droseraceae	<i>Drosera peltata</i>									5									5	5					
Ericaceae	<i>Epacris microphylla</i>	4	5								5	5							5	5	5				5
	<i>Epacris obtusifolia</i>																							5	
	<i>Leucopogon esquamatus</i>										5									5					
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>																			5					
	<i>Sprengelia incarnata</i>					5																			
Euphorbiaceae	<i>Micrantheum ericoides</i>																		5						
Fabaceae (Faboideae)	<i>Gompholobium glabratum</i>									5									5						
	++ <i>Pultenaea aristata</i> ▲2V		5								5								5						
Fabaceae (Mimosoideae)	<i>Acacia</i> sp.									5															
Goodeniaceae	<i>Dampiera stricta</i>	5							5	5	5		5					5	5	5	5	5	5	5	5
Iridaceae	<i>Patersonia sericea</i>									5															5
Lauraceae	<i>Cassytha glabella</i>	5	5	5			5			5		5						5	5	5	5				5

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – Vegetation condition

		Transect 1									Transect 2							Transect 3								
Family	Species	S136T1Q1S19	S136T1Q2S19	S136T1Q3S19	S136T1Q4S19	S136T1Q5S19	S136T1Q6S19	S136T1Q7S19	S136T1Q8S19	S136T1Q9S19	S136T2Q1S19	S136T2Q2S19	S136T2Q3S19	S136T2Q4S19	S136T2Q5S19	S136T2Q6S19	S136T2Q7S19	S136T3Q1S19	S136T3Q2S19	S136T3Q3S19	S136T3Q4S19	S136T3Q5S19	S136T3Q6S19	S136T3Q7S19	S136T3Q8S19	
Lindsaeaceae	<i>Lindsaea linearis</i>		5						5	5	5				5			5		5	5	5	5		5	
Lomandraceae	<i>Lomandra obliqua</i>	5								5								5		5						
Myrtaceae	<i>Baeckea imbricata</i>									5		5						5	5	5	5			5	4	
	<i>Corymbia gummifera</i>	4																	5							
	<i>Darwinia diminuta</i> ▲2RCi																		5							
	<i>Leptospermum arachnoides</i>									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		
	<i>Leptospermum trinervium</i>																								5	
	<i>Micromyrtus ciliata</i>													5												
Poaceae	<i>Anisopogon avenaceus</i>									5															5	
	<i>Entolasia stricta</i>	5		5		5		5									5			5	5	5				
	<i>Tetrarrhena turfosa</i>	5																								
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	4	5	5	5	4	5	4	5	5	5	4	5	5	5	3	5	5		5	5	5	5	5	5	
	<i>Banksia oblongifolia</i>									5			5							5						
	<i>Grevillea oleoides</i>											5														
	<i>Hakea teretifolia</i>	5	5	5	5	5	5	5		5	5			5	5	5		5	5	5	5	5	5	5	5	
	<i>Lomatia silaifolia</i>									5																
	<i>Petrophile pulchella</i>	5	5						5	5	5	5			5				5	5	5	4	5	5	5	5
	<i>Petrophile sessilis</i>	5																								
Restionaceae	<i>Baloskion gracile</i>										5															
	<i>Chordifex dimorphus</i>																		5							
	<i>Chordifex fastigiatus</i>																							4	5	
	<i>Empodisma minus</i>			5			5									3	3							5		
	<i>Leptocarpus tenax</i>		5						5		5	5	5		5			5	5	5	5		5			
	<i>Lepyrodia scariosa</i>	5	5	5	5		5	4	5	5	5	5	5				2	5	5		5		5	5	5	
Rhamnaceae	<i>Cryptandra ericoides</i>										5															

Upland Swamp monitoring sites – Spring 2019

Swamp 136 – Vegetation condition

		Transect 1									Transect 2							Transect 3							
Family	Species	S136T1Q1S19	S136T1Q2S19	S136T1Q3S19	S136T1Q4S19	S136T1Q5S19	S136T1Q6S19	S136T1Q7S19	S136T1Q8S19	S136T1Q9S19	S136T2Q1S19	S136T2Q2S19	S136T2Q3S19	S136T2Q4S19	S136T2Q5S19	S136T2Q6S19	S136T2Q7S19	S136T3Q1S19	S136T3Q2S19	S136T3Q3S19	S136T3Q4S19	S136T3Q5S19	S136T3Q6S19	S136T3Q7S19	S136T3Q8S19
Schizaeaceae	<i>Schizaea bifida</i>									5															
Stylidiaceae	<i>Stylidium lineare</i>																	5						5	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>		5							5									5						
Total		20	14	11	6	8	9	11	13	23	20	13	11	6	9	7	6	15	24	23	16	12	12	15	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

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)

Upland Swamp monitoring sites – Spring 2019

Swamp 137a – Vegetation condition

		Transect 1										Transect 2						Transect 3					
Family	Species	S137aT1Q1S19	S137aT1Q2S19	S137aT1Q3S19	S137aT1Q4S19	S137aT1Q5S19	S137aT1Q6S19	S137aT1Q7S19	S137aT1Q8S19	S137aT1Q9S19	S137aT2Q1S19	S137aT2Q2S19	S137aT2Q3S19	S137aT2Q4S19	S137aT2Q5S19	S137aT2Q6S19	S137aT3Q1S19	S137aT3Q2S19	S137aT3Q3S19	S137aT3Q4S19	S137aT3Q5S19	S137aT3Q6S19	S137aT3Q7S19
Apiaceae	<i>Actinotus minor</i>	5	5								5	5							5				
Casuarinaceae	<i>Allocasuarina distyla</i>												5										
	<i>Allocasuarina littoralis</i>											5											
Colchicaceae	<i>Burchardia umbellata</i>																		5				
Cunoniaceae	<i>Bauera microphylla</i>																						5
Cyperaceae	<i>Cyathochaeta diandra</i>	5	5	5							5	5	5				5	5	5	5	5	4	5
	<i>Lepidosperma neesii</i>	5	5	5	5	5	5	5	4	4	5	5	4	5	5	4	5	5	5	5	5		5
	<i>Ptilothrix deusta</i>	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5		5	5	5			5
	<i>Schoenus brevifolius</i>	4	4	4	4	5	5	5	4	4							5	5	3		5	4	5
Dilleniaceae	<i>Hibbertia serpyllifolia</i>		5																				
Droseraceae	<i>Drosera peltata</i>								5														
Ericaceae	<i>Epacris microphylla</i>	5	5	5							5	5	5	5									
	<i>Epacris obtusifolia</i>									5													
	<i>Leucopogon microphyllus</i> var. <i>microphyllus</i>	5																					
Fabaceae (Faboideae)	<i>Dillwynia floribunda</i>	5	5	5		5			5		5	5	5	5	5		5	5	5	5		5	5
	<i>Mirbelia rubiifolia</i>															5							5
	<i>Pultenaea tuberculata</i>										5	5											
Goodeniaceae	<i>Dampiera stricta</i>		5														5	5	5	5	5		
Iridaceae	<i>Patersonia sericea</i>										5												
Lauraceae	<i>Cassytha glabella</i>		5	5					5	5	5				5		5	5	5	5		5	5
Lindsaeaceae	<i>Lindsaea linearis</i>	5																					
Lomandraceae	<i>Lomandra obliqua</i>										5												
Myrtaceae	<i>Baeckea imbricata</i>			5				5	5				5	5	5	5	5	5	5	5	5	5	5
	<i>Darwinia diminuta</i> ▲2RCi														5								
	<i>Darwinia fascicularis</i>										5					5				5			
	<i>Eucalyptus racemosa</i>														5								

Upland Swamp monitoring sites – Spring 2019

Swamp 137a – Vegetation condition

		Transect 1										Transect 2						Transect 3						
Family	Species	S137aT1Q1S19	S137aT1Q2S19	S137aT1Q3S19	S137aT1Q4S19	S137aT1Q5S19	S137aT1Q6S19	S137aT1Q7S19	S137aT1Q8S19	S137aT1Q9S19	S137aT2Q1S19	S137aT2Q2S19	S137aT2Q3S19	S137aT2Q4S19	S137aT2Q5S19	S137aT2Q6S19	S137aT3Q1S19	S137aT3Q2S19	S137aT3Q3S19	S137aT3Q4S19	S137aT3Q5S19	S137aT3Q6S19	S137aT3Q7S19	
	<i>Kunzea capitata</i>															5								
	<i>Leptospermum arachnoides</i>										5	5	5									5		
	<i>Leptospermum squarrosum</i>	4	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												
	<i>Micromyrtus ciliata</i>										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	5	5	5	5	5	5	5	4	5	5		5	5	5	5	5	5	5	
	<i>Banksia oblongifolia</i>																5		5					
	<i>Grevillea oleoides</i>																5							
	<i>Hakea dactyloides</i>											5												
	<i>Hakea gibbosa</i>		5	5		5	5	5					5				5							
	<i>Hakea teretifolia</i>	4	5	4	5	5	5	5	5	5	3	5		5	5		5	5	4	5	5	3	5	
	<i>Isopogon anethifolius</i>	5	5																					
	<i>Persoonia levis</i>																			5				
	<i>Persoonia pinifolia</i>									5									5					
	<i>Petrophile pulchella</i>	5	4	5	5		5				5	5	5	5				5	5	5	5	5		
Restionaceae	<i>Chordifex fastigiatus</i>	5	5		5		5	5	4	4	5		4		5			5	5		5	5	5	
	<i>Empodisma minus</i>										5													
	<i>Leptocarpus tenax</i>	5	5		5				5	5		5	5	5			5	5	5	5		5		
	<i>Lepyrodia scariosa</i>	5	5					5	5		5	5	5	5	5	3		5	4	5	5	5	5	
Stylidiaceae	<i>Stylidium lineare</i>												5					5	5	5			5	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>			5						5	5						5		5	5				
	Total	17	19	14	9	9	9	10	13	12	23	17	16	11	12	9	16	16	21	17	11	14	14	

Condition Scale

1 = severe damage/dieback

▲ RoTAP species

2: Geographic range in Australia less than 100 km

2 = many dead stems
3 = some dead branches
4 = minor damage
5 = healthy

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)

Upland Swamp monitoring sites – Spring 2019

Swamp 137b – Vegetation condition

		Transect 1							Transect 2								Transect 3								
Family	Species	S137bT1Q1S19	S137bT1Q2S19	S137bT1Q3S19	S137bT1Q4S19	S137bT1Q5S19	S137bT1Q6S19	S137bT1Q7S19	S137bT2Q1S19	S137bT2Q2S19	S137bT2Q3S19	S137bT2Q4S19	S137bT2Q5S19	S137bT2Q6S19	S137bT2Q7S19	S137bT2Q8S19	S137bT2Q9S19	S137bT2Q10S19	S137bT3Q1S19	S137bT3Q2S19	S137bT3Q3S19	S137bT3Q4S19	S137bT3Q5S19	S137bT3Q6S19	
Casuarinaceae	<i>Allocasuarina distyla</i>		5										5	5	1			5	2		5				
Cyperaceae	<i>Chorizandra cymbaria</i>											5	5	1			5	2							
	<i>Cyathochaeta diandra</i>	5	5	5	5	5	5		5				4						5	5	5		5	4	
	<i>Lepidosperma limicola</i>																				5				
	<i>Lepidosperma neesii</i>	5	5	5	5	5	5	5	5	5	4	5	5	5			5		5	5	5	4	4	5	
	<i>Ptilothrix deusta</i>	5	5	5	5	5	5	5	5	5	5	5	5		5		5	5	5	5	5	4	5	5	
	<i>Schoenus brevifolius</i>		5	4	4	5	4	5	5	5	4	5	5	5	4	4	5	5	4				4		4
Dilleniaceae	<i>Hibbertia serpyllifolia</i>			5																					
Ericaceae	<i>Epacris obtusifolia</i>					5										5	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			
Lauraceae	<i>Cassytha glabella</i>	5		5	5	5	5									5				5		3		5	
Myrtaceae	<i>Baeckea imbricata</i>	5	5	5	5			5																	
	<i>Darwinia fascicularis</i>					5	5																		
	<i>Leptospermum arachnoides</i>			5																					
	<i>Leptospermum squarrosum</i>	5	5	5	5	5	4	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	
Orchidaceae	<i>Cryptostylis erecta</i>						5																		
Proteaceae	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	
	<i>Hakea teretifolia</i>	5	5	3	5	5	5	5	5	5	5	5	5	5	4	5	5	5		5	5	5	5	5	
	<i>Petrophile pulchella</i>	5	5	5	4	5	4	5	5	5	5	5		4	5		5		5	5	5	5	5	5	
Restionaceae	<i>Chordifex fastigiatus</i>			5				5					5											4	
	<i>Empodisma minus</i>			4															5			5	5		
	<i>Leptocarpus tenax</i>											5		5				4	5	5			4		
	<i>Lepyrodia scariosa</i>	5	5	5	5	5	5	5												5		5		5	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>			5																				5	

Upland Swamp monitoring sites – Spring 2019

Swamp 137b – Vegetation condition

		Transect 1						Transect 2								Transect 3								
Family	Species	S137bT1Q1S19	S137bT1Q2S19	S137bT1Q3S19	S137bT1Q4S19	S137bT1Q5S19	S137bT1Q6S19	S137bT1Q7S19	S137bT2Q1S19	S137bT2Q2S19	S137bT2Q3S19	S137bT2Q4S19	S137bT2Q5S19	S137bT2Q6S19	S137bT2Q7S19	S137bT2Q8S19	S137bT2Q9S19	S137bT2Q10S19	S137bT3Q1S19	S137bT3Q2S19	S137bT3Q3S19	S137bT3Q4S19	S137bT3Q5S19	S137bT3Q6S19
		11	12	17	11	12	12	10	9	7	7	10	10	9	7	6	10	8	10	13	9	12	10	12
Total																								

Condition Scale

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

Indicator species data

Upland Swamps monitoring sites – Spring 2019

Longwall Sites – Condition and Reproductive Status for swamp indicator species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 40	<i>Epacris obtusifolia</i>	EE01	312395	6215952	3	5
Swamp 40	<i>Epacris obtusifolia</i>	EE02	312395	6215950	3	1
Swamp 40	<i>Epacris obtusifolia</i>	EE03	312390	6215953	5	1
Swamp 40	<i>Epacris obtusifolia</i>	EE04	312384	6215956	5	1
Swamp 40	<i>Epacris obtusifolia</i>	EE05	312384	6215957	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE06	312408	6215932	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE07	312413	6215931	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE08	312448	6215896	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE09	312446	6215897	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE10	312443	6215899	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE11	312455	6215901	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE12	312491	6215900	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE13	312492	6215900	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE14	312490	6215905	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE15	312489	6215906	4	1
Swamp 40	<i>Epacris obtusifolia</i>	EE16	312486	6215894	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE17	312479	6215887	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE18	312478	6215875	5	1
Swamp 40	<i>Epacris obtusifolia</i>	EE19	312468	6215874	1	1
Swamp 40	<i>Epacris obtusifolia</i>	EE20	312466	6215872	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS01	312395	6215949	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS02	312394	6215954	4	5
Swamp 40	<i>Sprengelia incarnata</i>	SS03	312395	6215954	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS04	312444	6215892	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS05	312444	6215892	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS06	312445	6215892	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS07	312448	6215894	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS08	312888	6215896	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS09	312452	6215899	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS10	312454	6215901	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS11	312491	6215901	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS12	312494	6215904	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS13	312486	6215895	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS14	312484	6215891	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS15	312477	6215886	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS16	312475	6215871	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS17	312476	6215872	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS18	312477	6215875	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS19	312481	6215872	1	1
Swamp 40	<i>Sprengelia incarnata</i>	SS20	312480	6215873	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE61	312793	6216792	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE62	312785	6216797	2	1
Swamp 53	<i>Epacris obtusifolia</i>	EE63	312785	6216798	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE64	312792	6216809	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE65	312807	6216835	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE66	312804	6216840	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE67	312801	6216839	1	1

Upland Swamps monitoring sites – Spring 2019

Longwall Sites – Condition and Reproductive Status for swamp indicator species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 53	<i>Epacris obtusifolia</i>	EE68	312786	6216866	4	1
Swamp 53	<i>Epacris obtusifolia</i>	EE69	312792	6216875	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE70	312797	6216875	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE71	312717	6216888	4	4
Swamp 53	<i>Epacris obtusifolia</i>	EE72	312799	6216864	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE73	312804	6216863	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE74	312806	6126875	4	3
Swamp 53	<i>Epacris obtusifolia</i>	EE75	312808	6216870	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE76	312808	6216863	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE77	312801	6216862	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE78	312799	6216867	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE79	312798	6216841	1	1
Swamp 53	<i>Epacris obtusifolia</i>	EE80	312798	6216839	4	3
Swamp 53	<i>Sprengelia incarnata</i>	SS61	312795	6216805	4	3
Swamp 53	<i>Sprengelia incarnata</i>	SS62	312799	6216806	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS63	312796	6216806	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS64	312794	6216806	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS65	312792	6216806	5	4
Swamp 53	<i>Sprengelia incarnata</i>	SS66	312794	6216812	5	3
Swamp 53	<i>Sprengelia incarnata</i>	SS67	312800	6216810	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS68	312802	6216812	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS69	312806	6216833	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS70	312804	6216840	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS71	312804	6216863	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS72	312802	6216871	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS73	312805	6216872	4	3
Swamp 53	<i>Sprengelia incarnata</i>	SS74	312808	6216863	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS75	312797	6216832	4	3
Swamp 53	<i>Sprengelia incarnata</i>	SS76	312794	6216830	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS77	312793	6216825	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS78	312787	6216823	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS79	312794	6216809	1	1
Swamp 53	<i>Sprengelia incarnata</i>	SS80	312800	6216805	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)

Upland Swamps 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>	EE101	308720	6216582	1	1
Swamp 101	<i>Epacris obtusifolia</i>	EE102	308719	6216583	4	3
Swamp 101	<i>Epacris obtusifolia</i>	EE103	308728	6216585	5	4
Swamp 101	<i>Epacris obtusifolia</i>	EE104	308735	6216588	1	1
Swamp 101	<i>Epacris obtusifolia</i>	EE105	308738	6216591	4	4
Swamp 101	<i>Epacris obtusifolia</i>	EE106	308743	6216594	5	5
Swamp 101	<i>Epacris obtusifolia</i>	EE107	308739	6216609	4	3
Swamp 101	<i>Epacris obtusifolia</i>	EE108	308736	6216606	4	4
Swamp 101	<i>Epacris obtusifolia</i>	EE109	308734	6216605	5	4
Swamp 101	<i>Epacris obtusifolia</i>	EE110	308730	6216606	3	4
Swamp 101	<i>Epacris obtusifolia</i>	EE111	308731	6216613	4	4
Swamp 101	<i>Epacris obtusifolia</i>	EE112	308729	6216615	3	2
Swamp 101	<i>Epacris obtusifolia</i>	EE113	308726	6216616	4	4
Swamp 101	<i>Epacris obtusifolia</i>	EE114	308728	6216619	3	4
Swamp 101	<i>Epacris obtusifolia</i>	EE115	308723	6216619	3	2
Swamp 101	<i>Epacris obtusifolia</i>	EE116	308722	6216616	3	3
Swamp 101	<i>Epacris obtusifolia</i>	EE117	308723	6216627	1	1
Swamp 101	<i>Epacris obtusifolia</i>	EE118	308718	6216632	1	1
Swamp 101	<i>Epacris obtusifolia</i>	EE119	308717	6216626	4	3
Swamp 101	<i>Epacris obtusifolia</i>	EE120	308717	6216621	3	3
Swamp 101	<i>Sprengelia incarnata</i>	SS101	308697	6216574	2	1
Swamp 101	<i>Sprengelia incarnata</i>	SS102	308700	6216574	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS103	308702	6216576	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS104	308700	6216578	3	1
Swamp 101	<i>Sprengelia incarnata</i>	SS105	308722	6216583	4	1
Swamp 101	<i>Sprengelia incarnata</i>	SS106	308729	6216589	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS107	308729	6216608	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS108	308738	6216606	5	1
Swamp 101	<i>Sprengelia incarnata</i>	SS109	308731	6216604	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS110	308731	6216604	3	1
Swamp 101	<i>Sprengelia incarnata</i>	SS111	308813	6216627	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS112	308814	6216624	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS113	308815	6216621	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS114	308820	6216617	2	1
Swamp 101	<i>Sprengelia incarnata</i>	SS115	308818	6216621	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS116	308818	6216620	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS117	308823	6216619	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS118	308824	6216620	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS119	308824	6216620	1	1
Swamp 101	<i>Sprengelia incarnata</i>	SS120	308827	6216618	1	1
Swamp 136	<i>Epacris obtusifolia</i>	EE181	308757	6216711	3	5
Swamp 136	<i>Epacris obtusifolia</i>	EE182	308756	6216708	5	5
Swamp 136	<i>Epacris obtusifolia</i>	EE183	308756	6216709	4	4
Swamp 136	<i>Epacris obtusifolia</i>	EE184	308754	6216710	4	4
Swamp 136	<i>Epacris obtusifolia</i>	EE185	308757	6216716	4	4
Swamp 136	<i>Epacris obtusifolia</i>	EE186	308754	6216718	1	1
Swamp 136	<i>Epacris obtusifolia</i>	EE187	308754	6216720	3	3

Upland Swamps monitoring sites – Spring 2019

Control Sites – Condition and Reproductive Status for swamp indicator species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 136	<i>Epacris obtusifolia</i>	EE188	308754	6216721	4	4
Swamp 136	<i>Epacris obtusifolia</i>	EE189	308755	6216724	4	4
Swamp 136	<i>Epacris obtusifolia</i>	EE190	308752	6216724	5	5
Swamp 136	<i>Epacris obtusifolia</i>	EE191	308750	6216718	4	5
Swamp 136	<i>Epacris obtusifolia</i>	EE192	308749	6216720	4	5
Swamp 136	<i>Epacris obtusifolia</i>	EE193	308753	6216727	4	5
Swamp 136	<i>Epacris obtusifolia</i>	EE194	308753	6216727	4	4
Swamp 136	<i>Epacris obtusifolia</i>	EE195	308744	6216727	3	4
Swamp 136	<i>Epacris obtusifolia</i>	EE196	308745	6216725	1	1
Swamp 136	<i>Epacris obtusifolia</i>	EE197	308746	6216728	1	1
Swamp 136	<i>Epacris obtusifolia</i>	EE198	308758	6216725	4	3
Swamp 136	<i>Epacris obtusifolia</i>	EE199	308757	6216717	5	4
Swamp 136	<i>Epacris obtusifolia</i>	EE200	308752	6216715	3	1
Swamp 136	<i>Sprengelia incarnata</i>	SS141	308817	6216737	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS142	308817	6216735	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS143	308820	6216740	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS144	308820	6216739	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS145	308822	6216737	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS146	308826	6216745	5	5
Swamp 136	<i>Sprengelia incarnata</i>	SS147	308824	6216747	5	5
Swamp 136	<i>Sprengelia incarnata</i>	SS148	308821	6216745	5	5
Swamp 136	<i>Sprengelia incarnata</i>	SS149	308813	6216746	4	5
Swamp 136	<i>Sprengelia incarnata</i>	SS150	308811	6216750	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS151	308813	6216748	4	4
Swamp 136	<i>Sprengelia incarnata</i>	SS152	308815	6216749	4	5
Swamp 136	<i>Sprengelia incarnata</i>	SS153	308815	6216749	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS154	308811	6216752	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS155	308812	6216752	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS156	308809	6216753	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS157	308809	6216753	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS158	308811	6216748	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS159	308810	6216743	1	1
Swamp 136	<i>Sprengelia incarnata</i>	SS160	308811	6216742	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE121	308462	6217143	4	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE122	308465	6217143	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE123	308461	6217145	3	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE124	308458	6217143	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE125	308455	6217142	5	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE126	308455	6217143	3	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE127	308456	6217145	4	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE128	308458	6217153	4	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE129	308457	6217153	5	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE130	308456	6217153	4	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE131	308452	6217144	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE132	308456	6217137	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE133	308456	6217137	3	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE134	308456	6217138	3	1

Upland Swamps monitoring sites – Spring 2019

Control Sites – Condition and Reproductive Status for swamp indicator species

Site	Species	Tag	Coordinates		Condition	Reproductive Status
			Easting	Northing		
Swamp 137a	<i>Epacris obtusifolia</i>	EE135	308338	6217187	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE136	308336	6217186	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE137	308334	6217183	4	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE138	308337	6217181	1	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE139	308334	6217177	5	1
Swamp 137a	<i>Epacris obtusifolia</i>	EE140	308329	6217175	5	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS81	308372	6216972	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS82	308365	6216973	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS83	308364	6216969	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS84	308361	6216961	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS85	308359	6216961	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS86	308359	6216960	2	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS87	308361	6216957	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS88	308359	6216958	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS89	308361	6216953	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS90	308353	6216954	4	2
Swamp 137b	<i>Sprengelia incarnata</i>	SS91	308358	6216951	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS92	308358	6216953	4	4
Swamp 137b	<i>Sprengelia incarnata</i>	SS93	308358	6216955	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS94	308354	6216953	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS95	308353	6216949	4	5
Swamp 137b	<i>Sprengelia incarnata</i>	SS96	308354	6216951	3	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS97	308353	6216951	5	5
Swamp 137b	<i>Sprengelia incarnata</i>	SS98	308351	6216950	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS99	308350	6216948	1	1
Swamp 137b	<i>Sprengelia incarnata</i>	SS100	308349	6216948	4	4

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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