Appendix 5

Pambalong Nature Reserve Monitoring Plan:

2009/10 Monitoring Report

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ecobiological
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Abel Underground Coalmine Sub-tropical Rainforest Monitoring Plan:
2009 Annual Report.

Abel Underground Coalmine Sub-tropical Rainforest Monitoring Plan:

2009 Monitoring Report.

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Report prepared for Donaldson Coal Pty Ltd.

Prepared by:
ecobiological

K. Peters

Kristy Peters
Ecologist
NPWS Scientific Licence S12398

Reviewed by:

Dan Pedersen
Biologist
NPWS Scientific Licence S12398

Colin Driscoll
Hunter Eco
NPWS Scientific Licence S10565

PO Box 585
Warners Bay NSW 2282

2/9 Oakdale Road
Gateshead NSW 2290

Tel 1300 881 869
Fax 1300 881 035

www.ecobiological.com.au

ABN 74 114 440 041

ecobiological
survey & assessment

Executive Summary

Donaldson Coal Pty Ltd commenced operations at Abel Underground Coalmine at Beresfield in the lower Hunter Valley, New South Wales, during 2008. To comply with part of the conditions of consent a Flora and Fauna Management Plan (F&FMP) was prepared in late 2007 by **ecobiological**.

The F&FMP identified the need to establish a Sub-tropical Rainforest Monitoring Plan (SRMP) to monitor the sub-tropical rainforest areas of Long Gully Creek. While there are several areas of rainforest in the surface vegetation, the most extensive and best developed lies in the Long Gully Creek system. This is the area that the rainforest monitoring was conducted in between September 2009 and January 2010. This area also lies where subsidence could have the largest impact. Monitoring of the sub-tropical rainforest is directed at assessing the stability of the rainforest to dry forest interface as well as the floristic and faunal diversity within the rainforest proper.

This report provides the first annual monitoring results since the completion of a baseline assessment by **ecobiological** in 2008 and details the occurrence of flora, fauna and threatened species against which any changes over time can be measured and evaluated. The results of the current survey were similar to those of the baseline survey, representing no substantial change in floral or faunal diversity. Two threatened bat species (Little Bentwing-bat *Miniopterus australis* and Eastern Freetail-bat *Mormopterus norfolkensis*) listed as vulnerable under the NSW *Threatened Species Conservation Act* 1995 were detected during the 2009 survey.

It has been estimated that it will take approximately 10 years before any impact on the sub-tropical rainforest is likely to occur from subsidence, which will allow enough time to gather suitable information on the presence and status of threatened species present in this area. This information will then be available to inform best practice measures to be incorporated into the Subsidence Management Plan (SMP). The Surface Ecological Monitoring Plan (SEMP), of which this plan forms a part, will continue until one year after mining has passed the Long Gully and Blue Gum Creek catchments.

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1. Introduction

Donaldson Coal Pty Ltd (Donaldson) commenced mining during 2008 at a new underground mine (known as Abel Underground Coal Mine), located approximately 23 kilometres north-west of Newcastle. The mine will extract up to 4.5 million tonnes per year over 21 years using high productivity continuous miner based bord and pillar systems, and pillar extraction techniques. The seams to be mined are located under the Black Hill rural residential and adjoining forested areas. Mine access and associated surface infrastructure is located within the existing Donaldson Coal mine open cut void at Beresfield, with transfer of coal to the existing Bloomfield Coal Handling and Preparation Plant (CHPP) immediately to the north for coal washing and rail transport to the Port of Newcastle.

Underground coal mining is often associated with adverse environmental impacts due to subsidence (Bell *et al.* 2000, Sidle *et al.* 2000). Subsidence can cause loss of productive land, damage to underground pipelines and above-ground structures, decreased stability of slopes and escarpments, contamination of groundwater by acid drainage and dewatering of streams and groundwater supplies (Sidle *et al.* 2000). Of these, one of the major environmental concerns arising from the Abel mine is the effect of subsidence on local and regional hydrology. Surface and sub-surface cracking associated with mining subsidence can alter surface flow and create preferential flow paths, thus causing dewatering and rerouting of surface water and groundwater (Sidle *et al.* 2000). Alterations in channel and drainage morphology may also affect channel erosion, sediment delivery, and routing in streams and riparian habitat.

Associated with development approval for the Abel coal mine were a number of conditions of consent. These conditions included a requirement for the preparation of a Flora and Fauna Management Plan (F & FMP) which was prepared by EcoBiological in 2007. The F & FMP, which forms part of a comprehensive Environmental Management System for the Abel mine, sets out a strategy to monitor the effectiveness of the conservation measures proposed in the Environmental Assessment (EA) Statement of Commitments for the overall operation of the mine. Part of this strategy was to establish a Surface Ecological Monitoring Plan (SEMP) to monitor the effectiveness of the conservation measures proposed in the EA to mitigate against subsidence impacts on three distinct habitat areas; farm dams that form a belt across the mine site; subtropical rainforest areas of Long Gully Creek; and Pambalong Nature Reserve.

The SEMP outlines a monitoring plan for each of these areas by which baseline and subsequent monitoring data are to be gathered to inform future management. This report forms the first annual monitoring report for the Sub-tropical Rainforest Monitoring and Management Plan (SRMP) since the completion of the baseline study in 2008, and forms part of the overall SEMP.

2. Location

The Abel Underground Mine is located within Newcastle, Cessnock and Maitland local government areas (LGAs). The majority of the underground mine and surface infrastructure area is within the Cessnock LGA.

The location of the underground mine area and surface facilities is shown in Figure 1. The underground mine area is bounded on the eastern side by the F3 Freeway; the western and southern sides by a tract of forest that extends south to the Central Coast and beyond to Hornsby, and the northern side by existing open cut coal mining activities within the Donaldson and Bloomfield mine leases.

The Abel underground mine area is approximately 2750 ha and consists of low undulating forested hills with patches of cleared land for 110 rural/residential properties. Large areas of land are owned by Donaldson, Coal and Allied and the Catholic Diocese of Maitland and Newcastle. Black Hill School, various local roads and other infrastructure are located in the area.

A ridgeline associated with Black Hill runs east-west through the proposed underground mine area. Tributaries of Buttai Creek, Viney Creek/Weakley's Flat Creek and Four Mile Creek drain northwards from this ridgeline. A wide catchment containing Long Gully and Blue Gum Creek drains from the ridgeline providing water to the wet swamp at Pambalong Nature Reserve. Some cliff-lines and steeper gullies are located along sections of the Black Hill ridge.

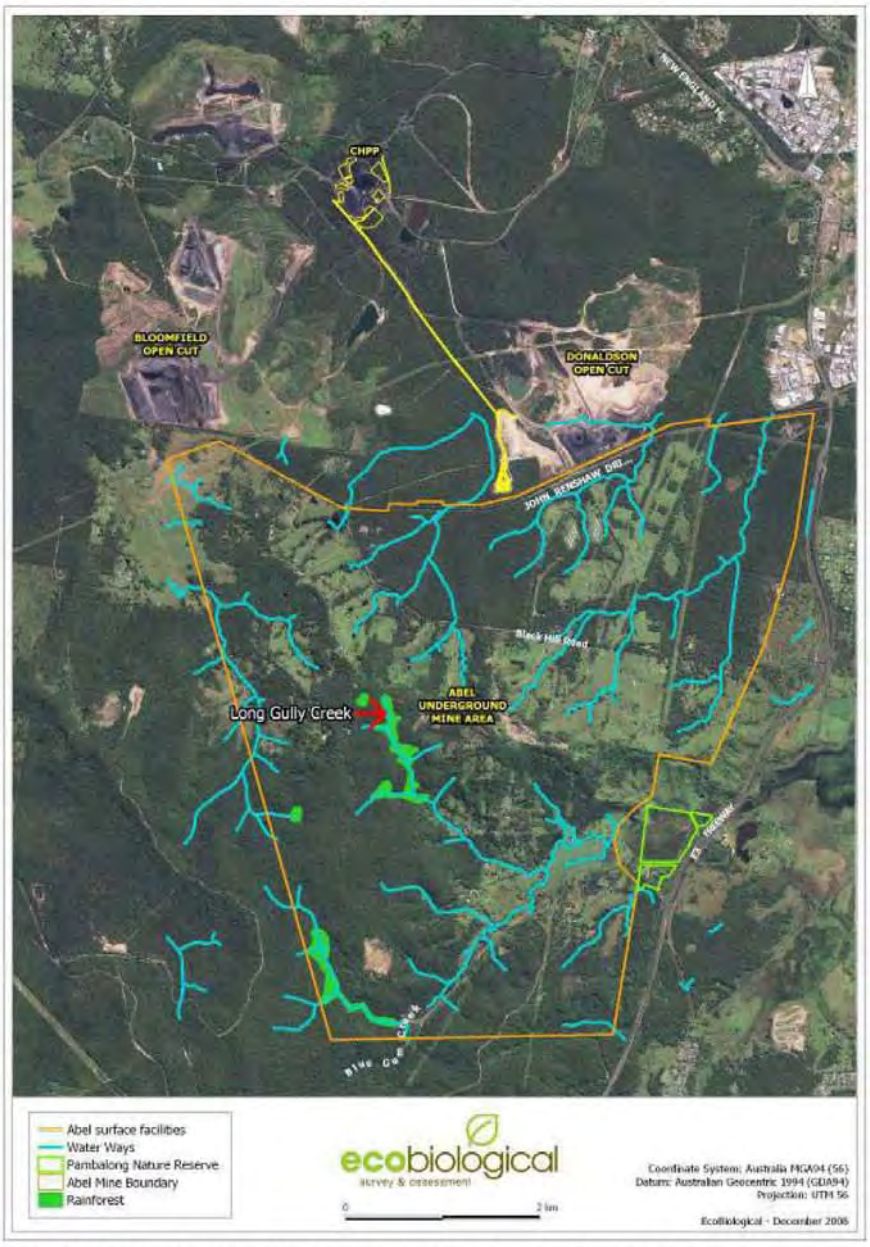

Figure 1: The location of the Abel Underground mine area and surface facilities.

3. Methods

3.1. Floral Diversity

Monitoring of rainforest vegetation across Long Gully Creek was undertaken to indicate whether the rainforest community is stable, expanding or contracting. This was achieved using two transects extending across the width of the rainforest, starting and ending in the adjoining dry forest (Figure 2). The transect length across the rainforest gully for Transect 1 was 70 m and 50 m for Transect 2. Transects were divided into quadrats 5 m long by 1 m wide, end-to-end. The following was recorded for each quadrat:

- Total floristic content with the species being classified as a dry or moist forest species as well as whether the species belonged to the ground, shrub, midstorey or overstorey/emergent structural layers; and,
- An estimate of the foliage projective cover (FPC), as defined in Walker and Hopkins (1988), of vegetation in the ground, shrub, midstorey, overstorey and vine structural layers. The estimated FPC was recorded for each 5m quadrat for each structural layer.

A second order polynomial trend line was used to determine the transitional zones between moist and dry forest types. R^2 values were also calculated to determine how well the fitted lines explained the data. The closer the R^2 value is to 1, the higher confidence that the trend line fits the data.

A sample was taken from any plants unable to be identified at the subject site for later identification. Floristic identification and nomenclature was based on Harden (1992, 1993, 2000, 2002) with subsequent revisions as published on PlantNet (://plantnet.rbgsyd.nsw.gov.au). Plants listed under the ROTAP scheme (Briggs and Leigh 1996) were also considered in this assessment along with species and vegetation deemed to be of local conservation significance.

Flora surveys were conducted on 9 and 10 December 2009.

3.2. Faunal Diversity

In order to determine the rainforest-dependent species, faunal diversity monitoring was centred on two transects approximately 200 m long, one situated in the rainforest and the second located in the surrounding dry forest. Fauna surveys were conducted between the September 2009 and January 2010.

Both trapping transects consisted of an equal number of Elliott A traps, Elliott B traps on the ground, hair tubes and harp traps. Seven Elliott B tree traps were placed in the dry forest transect, as compared with three along the rainforest transect. The reduced number of tree traps along the rainforest transect was due to an inability to erect traps in some otherwise suitable trees due to hardness of tree trunks and presence of poisonous plant species surrounding these trees. The location of fauna survey activities is shown in Figure 2. Table 1 depicts the total trap night count.

Table 1: Trapping statistics for the subject site.

Trap type	Traps	Nights	Trap nights
Elliott A	40	4	160
Elliott B Tree	10	4	40
Elliott B Ground	10	4	40
Harp Trap	2	4	8
Hair tubes	16	4	64

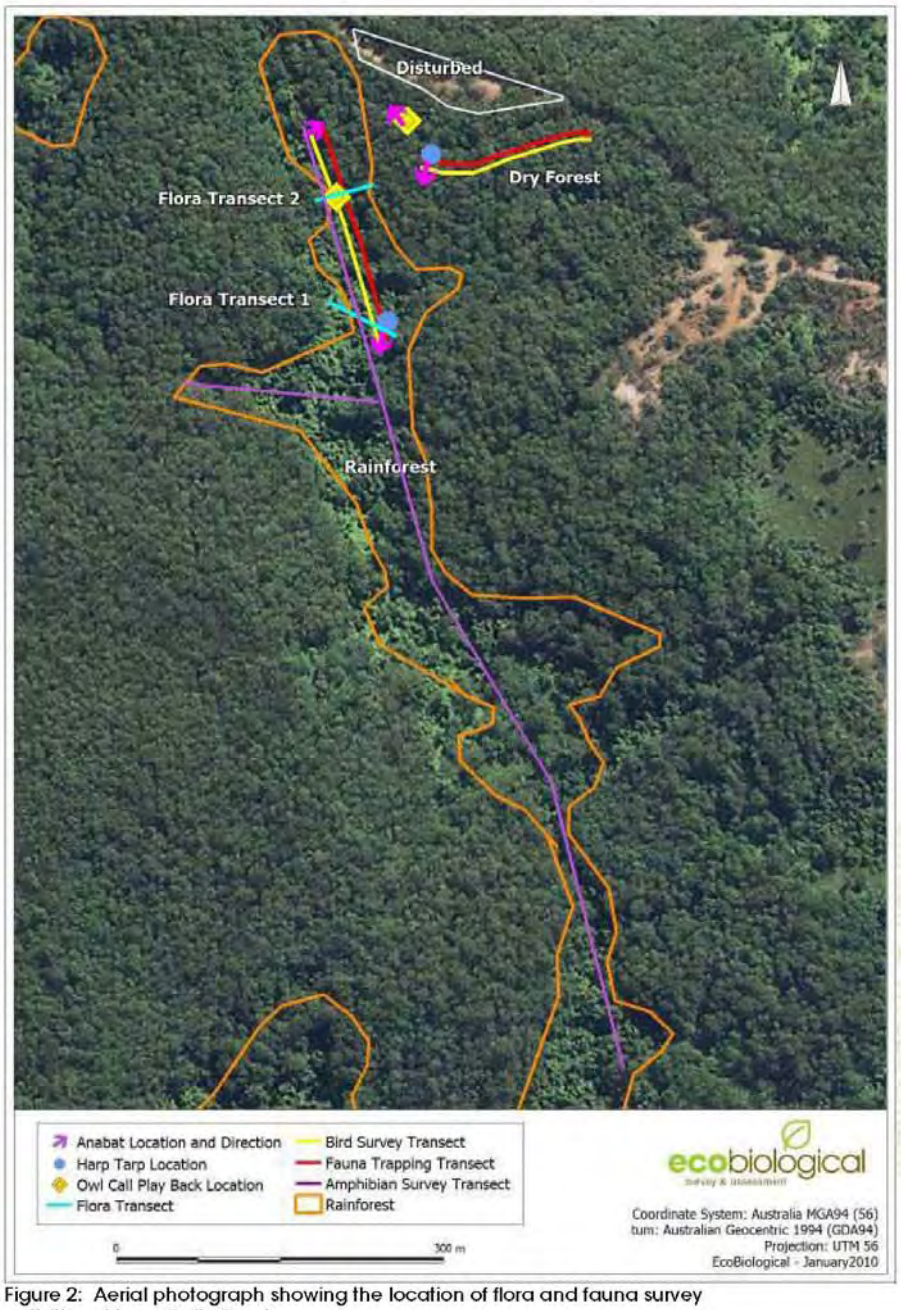

Figure 2: Aerial photograph showing the location of flora and fauna survey activities at Long Gully Creek.

3.2.1. Arboreal Mammals

For arboreal mammals, 10 Elliott B traps and 16 hair tubes were placed in trees at heights of 3m or above, along two transects and baited with a mixture of rolled oats, honey, peanut butter and treacle. The trunks of trees containing the traps were sprayed with a mixture of honey and water. These traps were check daily for arboreal species and wafers from the hair tubes were collected after a 4-night period and checked for the presence of hair samples. Hair identification methods followed those of Brunner *et al.* (2002). If any hair sample was from a vulnerable or endangered species, the sample was sent to Barbara Triggs, an expert in the field of hair identification for a second opinion.

Spotlighting was undertaken along each transect from dusk for a total of four person hours over two nights to identify the presence of any arboreal mammals. Trees were inspected during daylight hours for the presence of habitat hollows and if present these were watched at dusk to see if any nocturnal birds or mammals emerged.

3.2.2. Terrestrial Mammals

Forty Elliott A and 10 Elliott B traps were placed along two transects at regular intervals to target terrestrial mammal species. The traps were baited with a mix of rolled oats, honey, peanut butter and treacle and set in position for four consecutive nights and checked each morning.

Spotlighting was undertaken along each transect from dusk for a total of four person hours over two nights to identify the presence of any terrestrial mammals. Careful daytime searches were conducted to detect the presence of fauna activity such as diggings, droppings or scratch marks.

3.2.3. Bats

A harp trap was erected along each transect in bat 'flyways' such as across a natural forest opening in the dry forest and across the rainforest gully to maximise the likelihood of captures. The harp traps were set in position for four consecutive nights and checked each morning. Bats captured were identified in the field and placed in specially designed 'soft release' boxes tethered to nearby trees which enable the bats to shelter during the day and exit the boxes on nightfall from narrow openings at the base of the box.

Anabat II bat-call recorders (Titley Electronics, Ballina) were used to record the calls of any Microchiropteran bats feeding in the area. The units were set up at dusk and recording occurred for a total of four hours at four locations over two nights. Spotlighting searches of blossoming trees were also undertaken to identify any Megachiropteran bat species.

3.2.4. Birds

A 20 minute bird survey of both the rainforest and dry forest transect was undertaken by walking the length of each transect on 1 October 2009 and again on 2 October 2009. Birds were identified either visually, with the aid of binoculars, or by call interpretation. Surveys were conducted in the morning when bird activity is maximised (Bibby *et al*. 2000). Opportunistic sightings were also recorded and listed separately to actual survey results.

After dark calls of threatened owl species (Powerful Owl, Masked Owl, Sooty Owl and Barking Owl) were broadcast over a megaphone in an attempt to encourage a call back response. The subject site was also searched to locate any regurgitated owl pellets. The size, shape and content of any pellets found were analysed to determine the species of owl from which the pellet originated as well as the prey species the owl had been feeding on. Analysis methods followed those of Brunner *et al.* (2002) and Triggs (1996).

3.2.5. Amphibians

A survey for amphibians was conducted along a portion of the length of the Long Gully rainforest. This involved standardised survey techniques for amphibian species including diurnal habitat searches, nocturnal spotlight surveys and dip netting for tadpoles. Call playback was also conducted for two species of threatened Barred River Frogs (*Mixophyes balbus* and *M. iteratus*) due to habitat being present that could form potential habitat for these species.

During diurnal surveys, dip netting and visual searches were carried out to locate any tadpoles present in any water bodies. During nocturnal surveys, spotlight searches were carried out by walking lengths of suitable habitat and using head torches to search for frogs by eye shine or by physical sightings.

Adult frogs encountered were identified by visual confirmation or by their distinct advertisement calls. Tadpoles were keyed out using diagnostic features including mouthparts (tooth rows, jaw sheaths and papillae),

pigmentation, body size, tail structure (musculature, fin depth, fin shape, tip shape), eye direction and spacing, pupil pigmentation, nare shape and spacing, spiracle height and direction, vent length and direction, and tadpole behaviour according to Anstis (2002).

4. Results

4.1. Weather Conditions and Survey Activities

The prevailing weather conditions throughout the trapping survey period at the subject site were warm to hot, humid days, with light to overcast conditions, no rain and light to moderate winds. The mean minimum temperature was 14 ° C, and the mean maximum temperature was 28° C. A full list of survey activities and weather conditions during the survey period are provided in Table 2.

Table 2: Schedule of activities and weather conditions during the survey period.

Activity	Day	Date	Weather Conditions
Flora			
Transect 1	Wednesday	9/12/09	Warm day, overcast, light breeze, no rain
Transect 2	Thursday	10/12/09	Warm day, overcast, calm, no rain
Fauna			
Trapping	Wednesday - Sunday	21 – 25/10/09	Warm to hot days and mild nights, clear to overcast skies, light to moderate winds, no rain
Nocturnal field work (Spotlighting, owl call playback, Anabat recording)	Monday	28/09/09	Mild, light cloud and breeze
	Friday	2/10/09	Mild, overcast, slight breeze
Bird survey	Thursday	1/10/09	Warm, dry morning, no cloud or wind
	Friday	2/10/09	Mild, humid morning, no cloud, light breeze
Amphibian survey	Friday	15/01/10	Warm evening, overcast, no rain or wind (good rainfall occurred within the study area in late December 09 and early January 2010)

4.2. Floral diversity

A total of 48 and 46 flora species were identified on Transect 1 and Transect 2 in 2009, respectively (Appendix 1). This is comparable with species richness found during the baseline study in 2008, in which 54 and 51 flora species were detected on Transect 1 and Transect 2, respectively.

No flora species listed as threatened under the NSW *Threatened Species Conservation Act* 1995 were recorded during surveys. One plant species *Eucalyptus fergusonii* subsp. *fergusonii* listed under ROTAP (Rare or Threatened Australian Plants) was recorded on Transect 2.

Flora species were assigned a preferred forest type or habitat, being either a dry forest or moist forest species (see Appendix 1). Figures 3 and 5 show the relationship between dry forest species and moist forest species over the length of each transect for 2008. Figures 4 and 6 show this relationship for 2009. The trend lines for Transect 1 have changed slightly since the baseline survey. The transition between dry and moist forest has expanded slightly in 2009, with the width of the moist increasing. The data is more variable than the previous year, as denoted by lower R^2 values. The trend lines for Transect 2 in 2009 remain similar to the baseline survey. The transition from dry forest to moist forest again commences at 5-10 m and from moist forest to dry forest at 40-45 m.

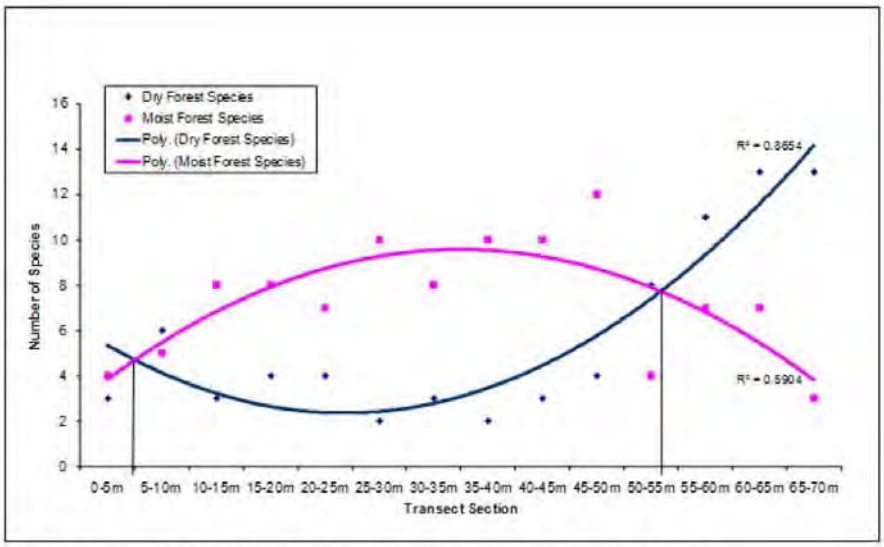

Figure 3. Transect 1 forest species curves, showing the relationship between dry and moist forest species across the length of the transect in 2008. Black lines indicate the forest transition zones determined in 2008.

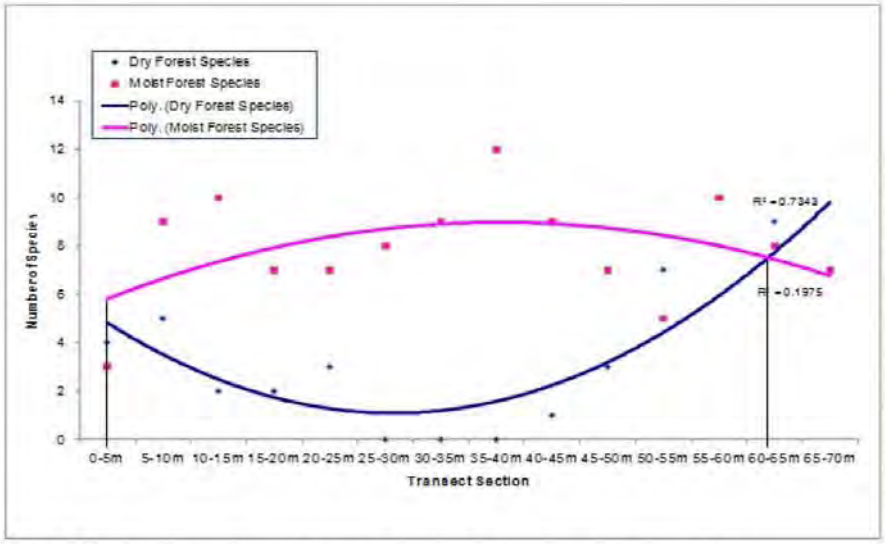

Figure 4: Transect 1 forest species curves, showing the relationship between dry and moist forest species across the length of the transect in 2009.

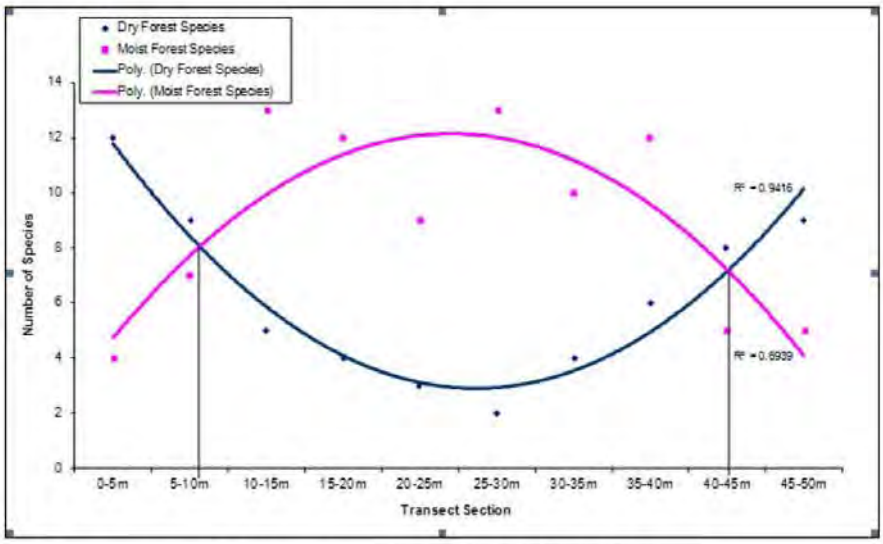

Figure 5. Transect 2 forest species curves, showing the relationship between dry and moist forest species across the length of the transect in 2008. Black lines indicate the forest transition zones determined in 2008.

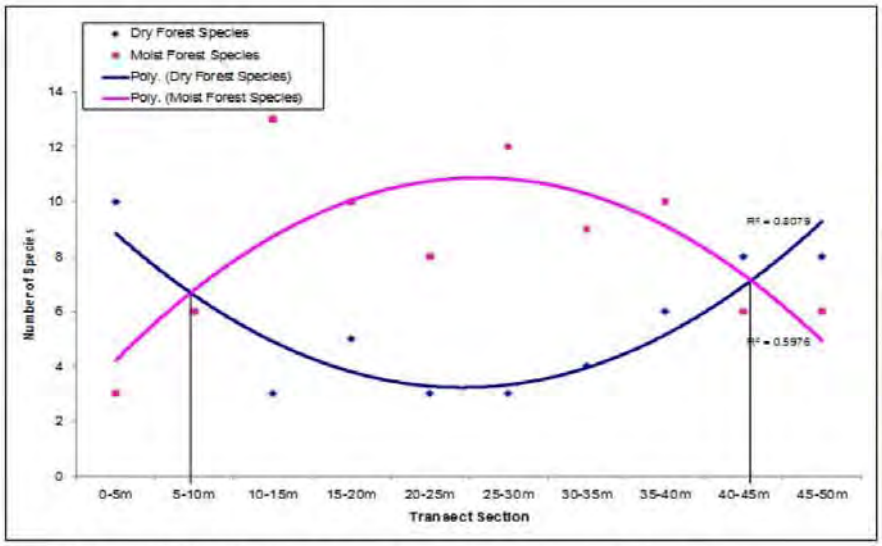

Figure 6: Transect 2 forest species curves, showing the relationship between dry and moist forest species across the length of the transect in 2009.

4.2.1. Structural Layer FPC Estimates

The estimated foliage projective coverage (FPC) has been separated into structural layers, including ground, shrub, midstorey, overstorey and vine layers (Figures 7 to 11). It should be noted that there is an inherent variability in the estimation of FPC. The estimation of FPC is not sensitive enough to detect slight changes between single years, it is rather an indication of major changes over several years.

The ground layer FPC has dropped slightly, by approximately 10%, since the baseline report at both Transect 1 and Transect 2. The shrub layer FPC has dropped between the intervals 25-30 m and 50-55 m on Transect 1 since the baseline monitoring event. This occurred due to the dieback of the exotic species *Lantana camara*. At Transect 2 the shrub layer has remained relatively static. The midstorey, overstorey and vine layers have not changed substantially since the baseline survey.

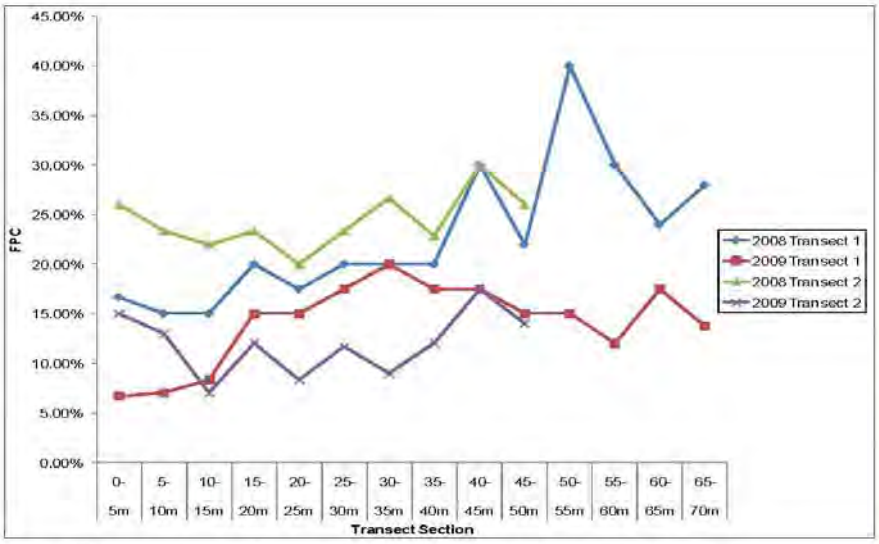

Figure 7: Estimated ground layer FPC for Transect 1 and Transect 2 in 2008 and 2009.

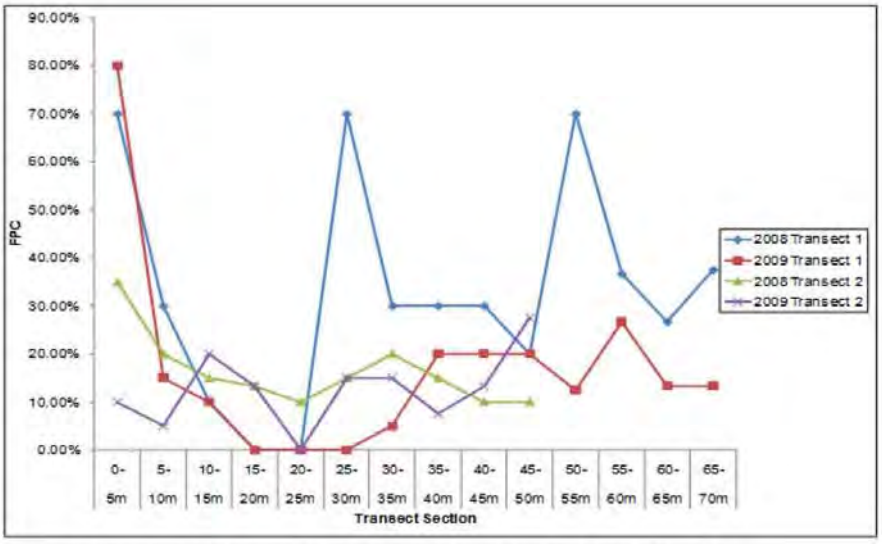

Figure 8: Estimated shrub layer FPC for Transect 1 and Transect 2 in 2008 and 2009.

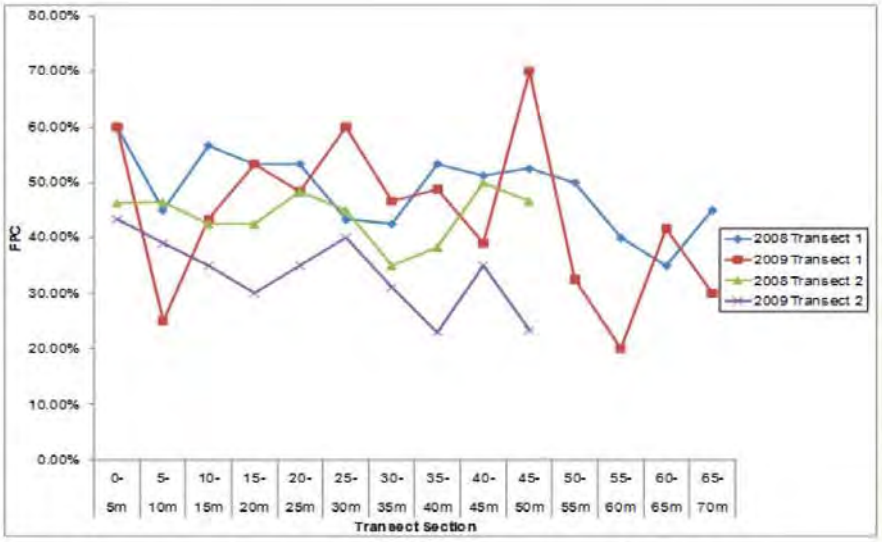

Figure 9: Estimated midstorey layer FPC for Transect 1 and Transect 2 in 2008 and 2009.

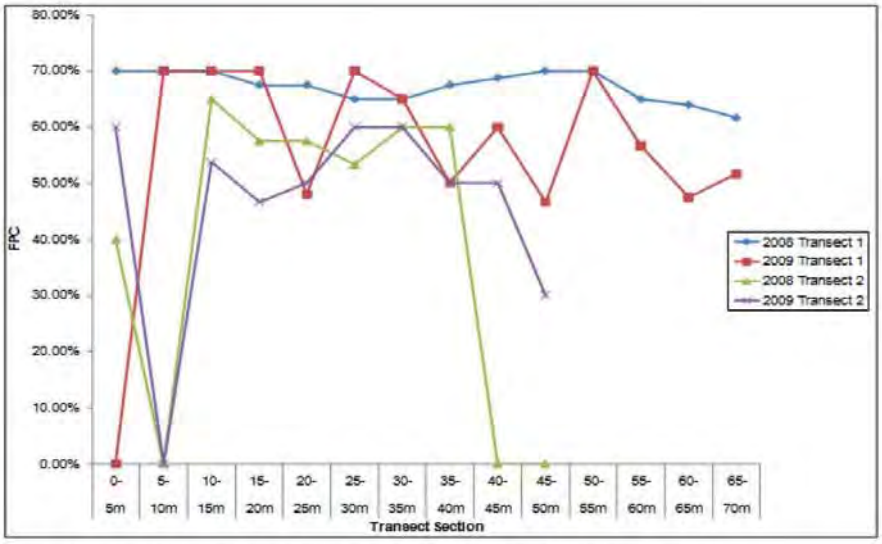

Figure 10: Estimated overstorey layer FPC for Transect 1 and Transect 2 in 2008 and 2009.

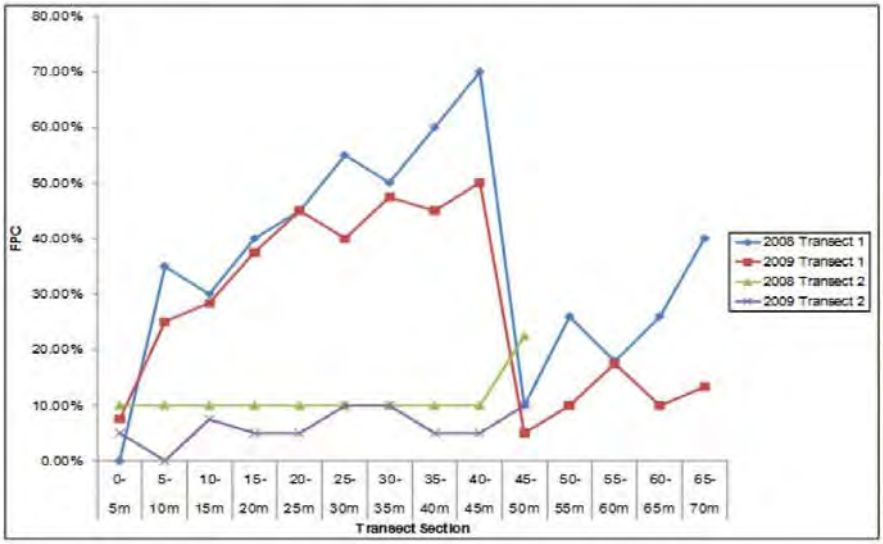

Figure 11: Estimated vine layer FPC for Transect 1 and Transect 2 in 2008 and 2009.

4.3. Faunal diversity

In total, 49 fauna species were recorded during the survey period, comprising two arboreal mammal species, three terrestrial mammal species, 35 bird species and nine bat species (Appendix 2). Two of these species (Little Bentwing-bat *Miniopterus australis* and Eastern Freetail-bat *Mormopterus norfolkensis*) are listed as threatened under the NSW *Threatened Species Conservation Act* 1995. Each group is discussed in more detail below, with comparisons made between the current results and the 2008 baseline study. Selected photographs of fauna species recorded during surveys of Long Gully Creek are also provided in Appendix 3.

4.3.1. Arboreal mammals

Two arboreal mammal species (Sugar Glider *Petaurus breviceps* and Common Brushtail Possum *Trichosurus vulpecula*) were recorded during the survey period. Arboreal mammal species richness between the 2008 baseline survey and the first annual monitoring survey in 2009 was found to be similar. However, *T. vulpecula* was recorded for the first time in 2009 and two species detected during the baseline survey (Feathertail Glider *Acrobates pygmaeus* and Greater Glider *Petauroides volans*) were not recorded during the current survey.

4.3.2. Terrestrial mammals

Three terrestrial mammal species were detected during the 2009 surveys (Brown Antechinus *Antechinus stuartii*, Bush Rat *Rattus fuscipes* and the Long-nosed Bandicoot *Perameles nasuta*). Terrestrial mammal species richness was similar between the 2008 baseline survey and the 2009 survey, with one species (Swamp Wallaby *Wallabia bicolor*) not recorded during the 2009 survey.

4.3.3. Birds

Bird species richness was similar between the two monitoring periods, with 35 species detected during the 2009 survey compared with 36 species recorded during the 2008 baseline survey.

Nine new bird species were recorded during the current survey, while 13 species detected in 2008 were not detected in 2009. One threatened nocturnal species, the Powerful Owl (*Ninox strenua*) previously recorded in 2008 was not detected in 2009.

4.3.4. Bats

Eight species of insectivorous bat could be confirmed as occurring in the study area during the 2009 survey, compared with six species recorded in 2008. Two short call sequences were recorded of a bat that was determined to be either the Eastern Broad-nosed Bat (*Scotorepens orion)* or the Eastern False Pipistrelle (*Falsistrellus tasmaniensis).* A decisive identification could not be made due to the lack of calls and poor call quality. Neither species has previously been detected at the site; however, suitable habitat is present for both species.

Three new bat species could be confirmed as occurring within the study area during 2009 (Eastern Freetail-bat *Mormopterus norfolkensis*, an undescribed Freetail-bat species known as *M.* sp. 2 and Gould's Long-eared Bat *Nyctophilus gouldi*).

4.3.5. Amphibians

No amphibian species were detected during the current surveys and there was no response from call playback. Two species have previously been recorded within the survey area during 2008, *Litoria fallax* and *L. peronii*. Despite recent rainfall events in the area, the section of Long Gully Creek where the amphibian survey was undertaken was predominantly dry with some small pools of water present.

5. Conclusion

Monitoring of the Sub-tropical Rainforest area within Long Gully Creek has been undertaken in 2009 in accordance with the F& FMP for Abel Underground Coalmine (ecobiological 2007). The results of this first annual monitoring report since the 2008 baseline survey show the current extent of the Sub-tropical Rainforest area and species richness of flora and fauna inhabiting it. Future annual surveys will provide ongoing data, which will be evaluated and any significant changes identified.

A total of 48 and 46 flora species were recorded along Transect 1 and Transect 2, respectively. This is similar to the results of the baseline survey, representing no substantial change in floral species richness. The transition between dry and moist forest has expanded slightly in 2009, with the width of the moist increasing. However, this is likely due to the variability of species richness within each quadrat along this transect, as represented by the low R^2 value, and does not represent any substantial change in rainforest width. The forest transitional zones for Transect 2 were determined as being the same in 2009 as the baseline study. The FPC along both Transect 1 and Transect 2 showed little variation between survey events. The only major change occurred in the shrub layer of Transect 1, which can be explained by the dieback of the exotic species *Lantana camara*. Overall, no major changes in the rainforest width or species richness could be detected during the 2009 monitoring.

In total, 49 fauna species were recorded during the survey period, comprising two arboreal mammal species, three terrestrial mammal species, 35 bird species and nine bat species. This is similar to the baseline survey (55 fauna species recorded), representing no significant change in faunal diversity. Two of these species (Little Bentwing-bat *Miniopterus australis* and Eastern Freetail-bat *Mormopterus norfolkensis*) are listed as threatened under the NSW *Threatened Species Conservation Act* 1995.

Annual monitoring prior to mining passing under the rainforest will enable determination of natural variation in species diversity and assemblages. Statistical analysis of this pre-mining data will be undertaken at an appropriate time (e.g. 12 months prior to mining passing under the rainforest gully) and for subsequent years post-mining to determine whether any trends are apparent in the data. The future implications of any evident trends should be used to inform best practice measures to be incorporated into the SMP.

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Appendix 1: Flora species recorded on the survey transects in 2008 & 2009

Family	Scientific Name	Common Name	Forest Type	Stratum	Transect 1		Transect 2	
					2008	2009	2008	2009
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower	Dry	Ground	✓	✓	✓	✓
Adiantaceae	*Adiantum formosum*	Giant Maidenhair Fern	Moist	Ground	✓	✓	✓	✓
Adiantaceae	*Adiantum hispidulum*	Rough Maidenhair Fern	Moist	Ground	✓	✓	✓	✓
Adiantaceae	*Pellaea falcata*	Sickle Fern	Dry	Ground	✓	✓	✓	✓
Aphanopetalaceae	*Aphanopetalum resinosum*	Gum Vine	Dry	Vine	✓	✓		
Apocynaceae	*Marsdenia rostrata*	Common Milk Vine	Dry	Vine	✓	✓		
Apocynaceae	*Parsonsia straminea*	Monkey Rope	Dry	Vine	✓			
Araceae	*Gymnostachys anceps*	Settlers Flax	Moist	Ground	✓	✓	✓	✓
Bignoniaceae	*Pandorea pandorana* subsp. *pandorana*	Wonga Wonga Vine	Dry	Vine	✓	✓	✓	✓
Blechnaceae	*Blechnum patersonii* subsp. *patersonii*	Strap Water Fern	Moist	Ground			✓	
Blechnaceae	*Doodia aspera*	Rasp Fern	Dry	Ground	✓	✓	✓	✓
Boraginaceae	*Ehretia acuminata*	Koda	Moist	Overstorey			✓	✓
Capparaceae	*Capparis arborea*	Native Pomegranate	Moist	Shrub	✓	✓	✓	✓
Commelinaceae	*Aneilema acuminatum*		Moist	Ground			✓	✓
Convolvulaceae	*Dichondra repens*	Kidney weed	Dry	Ground			✓	✓
Cornaceae	*Alangium villosum* subsp. *polyosmoides*	Muskwood	Moist	Overstorey	✓	✓		
Cyperaceae	*Carex* sp.		Moist	Ground			✓	✓
Dicksoniaceae	*Calochlaena dubia*	Rainbow Fern	Moist	Ground	✓	✓	✓	✓
Dioscoreaceae	*Dioscorea transversa*	Native Yam	Dry	Vine	✓	✓	✓	✓
Ebenaceae	*Diospyros australis*	Black Plum	Moist	Overstorey	✓	✓	✓	
Elaeocarpaceae	*Elaeocarpus obovatus*	Blueberry Ash	Moist	Overstorey			✓	✓
Euphorbiaceae	*Alchornea ilicifolia*	Dovewood	Moist	Midstorey	✓	✓	✓	✓
Euphorbiaceae	*Baloghia inophylla*	Brush Bloodwood	Moist	Midstorey	✓	✓	✓	✓
Euphorbiaceae	*Croton verreauxii*	Green Native Cascarilla	Dry	Midstorey	✓	✓	✓	✓
Fabaceae - Mimosoideae	*Acacia longissima*	Long-leaf Wattle	Dry	Shrub			✓	✓
Fabaceae - Mimosoideae	*Pararchidendron pruinosum* var. *pruinosum*	Snow Wood	Moist	Midstorey	✓	✓		
Flacourtiaceae	*Scolopia braunii*	Flintwood	Moist	Midstorey			✓	✓
Lamiaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum	Moist	Midstorey	✓			

Family	Scientific Name	Common Name	Forest Type	Stratum	Transect 1		Transect 2	
					2008	2009	2008	2009
Lamiaceae	*Plectranthus parviflorus*		Dry	Ground	✓	✓		
Lauraceae	*Cryptocarya microneura*	Murrogun	Moist	Overstorey	✓	✓		
Lauraceae	*Neolitsea australiensis*	Green Bolly Gum	Moist	Midstorey	✓	✓	✓	✓
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	Dry	Vine	✓	✓		
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	Dry	Vine	✓	✓	✓	✓
Malvaceae	*Hibiscus heterophyllus*	Native Rosella	Dry	Midstorey	✓	✓	✓	✓
Meliaceae	*Synoum glandulosum* subsp. *glandulosum*	Scentless Rosewood	Dry	Shrub	✓	✓		
Meliaceae	*Toona ciliata*	Red Cedar	Moist	Overstorey			✓	✓
Menispermaceae	*Legnephora moorei*	Round-leaf Vine	Moist	Vine			✓	✓
Menispermaceae	*Sarcopetalum harveyanum*	Pearl Vine	Moist	Vine		✓		
Menispermaceae	*Stephania japonica* var. *discolor*	Snake vine	Moist	Vine	✓			
Monimiaceae	*Doryphora sassafras*	Sassafras	Moist	Midstorey			✓	
Monimiaceae	*Wilkiea huegeliana*	Veiny Wilkiea	Moist	Shrub			✓	✓
Monimiaceae	*Wilkiea macrophylla*	Large-leaved Wilkiea	Moist	Midstorey			✓	✓
Moraceae	*Ficus fraseri*	Sandpaper Fig	Moist	Midstorey	✓			
Moraceae	*Ficus sp.*		Dry	Overstorey	✓			
Moraceae	*Streblus brunonianus*	Whalebone Tree	Moist	Midstorey	✓	✓	✓	✓
Moraceae	*Trophis scandens*	Burny Vine	Moist	Vine			✓	✓
Myrtaceae	*Backhousia myrtifolia*	Grey Myrtle	Moist	Overstorey	✓	✓		
Myrtaceae	*Eucalyptus acmenoides*	White mahogany	Dry	Overstorey			✓	✓
Myrtaceae	*+Eucalyptus fergusonii* subsp. *fergusonii*	Grey Ironbark	Dry	Overstorey			✓	✓
Myrtaceae	*Melaleuca styphelioides*		Dry	Overstorey	✓	✓		
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	Dry	Midstorey	✓			
Myrtaceae	*Syncarpia glomulifera*	Turpentine	Dry	Overstorey	✓	✓		
Oleaceae	*Notelaea longifolia*	Large Mock-olive	Dry	Shrub	✓	✓	✓	✓
Oleaceae	*Olea paniculata*	Native Olive	Moist	Overstorey			✓	✓
Orchidaceae	*Dendrobium* sp.		Dry	-	✓	✓		
Orchidaceae	*Sarcochilus falcatus*	Orange-blossom Orchid	Moist	-			✓	✓
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	Moist	Shrub	✓	✓		
Pittosporaceae	*Pittosporum multiflorum*	Orange Thorn	Moist	Shrub	✓	✓	✓	✓
Poaceae	*Oplismenus aemulus*	Basket Grass	Dry	Ground	✓	✓	✓	✓
Podocarpaceae	*Podocarpus elatus*	Plum Pine	Moist	Overstorey				✓
Polypodiaceae	*Pyrrosia confluens* var. *confluens*	Horse-shoe Felt Fern	Moist	-	✓	✓	✓	✓
Rhamnaceae	*Alphitonia excelsa*	Red Ash	Moist	Overstorey	✓	✓		✓

Family	Scientific Name	Common Name	Forest Type	Stratum	Transect 1		Transect 2	
					2008	2009	2008	2009
Ripogonaceae	*Ripogonum album*	White Supplejack	Moist	Vine	✓			
Rubiaceae	*Morinda jasminoides*	Sweet Morinda	Moist	Vine	✓	✓	✓	
Rutaceae	*Geijera salicifolia* var. *latifolia*		Moist	Midstorey			✓	
Sapindaceae	*Alectryon subcinereus*	Native Quince	Moist	Midstorey	✓	✓	✓	✓
Sapindaceae	*Guioa semiglauca*		Moist	Midstorey	✓	✓	✓	
Sapotaceae	*Planchonella australis*	Black Apple	Moist	Overstorey	✓	✓	✓	✓
Urticaceae	*Dendrocnide excelsa*	Giant Stinging Tree	Moist	Overstorey	✓	✓	✓	✓
Urticaceae	*Dendrocnide photinophylla*	Shiny-leaved Stinging Tree	Moist	Overstorey	✓	✓		
Verbenaceae	**Lantana camara*	Lantana	Dry	Shrub	✓	✓	✓	✓
Vitaceae	*Cayratia clematidea*	Native Grape	Dry	Vine	✓	✓	✓	✓
Vitaceae	*Cissus antarctica*	Water Vine	Moist	Vine	✓	✓	✓	
Vitaceae	*Tetrastigma nitens*		Moist	Vine	✓	✓		✓
				Total	54	48	51	46

* denotes an introduced species
+ denotes a ROTAP species

Appendix 2: Fauna species recorded on the subject site in 2008 & 2009

Scientific Name	Common Name	Method	Location			
			Dry forest - 2008	Dry forest - 2009	Rainforest - 2008	Rainforest - 2009
Amphibians						
Litoria fallax	Eastern Dwarf Tree Frog	Opportunistic record	+			
Litoria peronii	Peron's Tree Frog	Opportunistic record	+			
		Total	2	-	-	-
Reptiles						
Varanus varius	Lace Monitor	Opportunistic sighting	+			
		Total	1	-	-	-
Birds						
Acanthiza lineata	Striated Thornbill	Bird survey	+			
Acanthiza pusilla	Brown Thornbill	Bird survey	+		+	+
Acanthorhynchus tenuirostris	Eastern Spinebill	Bird survey	+	+	+	+
Aegotheles cristatus	Australian Owlet-nightjar	Spotlighting	+	+	+	
Ailuroedus crassirostris	Green Catbird	Bird survey				+
Alectura lathami	Australian Brush-turkey	Opportunistic record			+	
Alisterus scapularis	Australian King-Parrot	Bird survey		+	+	
Cacomantis flabelliformis	Fan-tailed Cuckoo	Bird survey	+			
Cacomantis variolosus	Brush Cuckoo	Opportunistic record	+			
Centropus phasianinus	Pheasant Coucal	Opportunistic record	+			
Chrysococcyx lucidus	Shining Bronze-Cuckoo	Bird survey		+	+	
Cinclosoma punctatum	Spotted Quail-thrush	Bird survey	+	+		+
Colluricincla harmonica	Grey Shrike-thrush	Bird survey	+		+	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Bird survey		+		
Coracina tenuirostris	Cicadabird	Opportunistic record	+			
Cormobates leucophaeus	White-throated Treecreeper	Bird survey	+	+	+	+
Corvus coronoides	Australian Raven	Opportunistic record	+			
Dacelo novaeguineae	Laughing Kookaburra	Bird survey		+		
Eopsaltria australis	Eastern Yellow Robin	Bird survey	+	+	+	+
Gerygone mouki	Brown Gerygone	Bird survey	+	+	+	+
Leucosarcia melanoleuca	Wonga Pigeon	Bird survey	+	+		
Lichenostomus chrysops	Yellow-faced Honeyeater	Bird survey	+	+		
Macropygia amboinensis	Brown Cuckoo-dove	Bird survey	+	+	+	+

Scientific Name	Common Name	Method	Location			
			Dry forest - 2008	Dry forest - 2009	Rainforest - 2008	Rainforest - 2009
Birds cont.						
Malurus cyaneus	Superb Fairy-wren	Bird survey		+		+
Malurus lamberti	Variegated Fairy-wren	Bird survey				+
Manorina melanophrys	Bell Miner	Bird survey	+			
Meliphaga lewinii	Lewin's Honeyeater	Bird survey	+	+	+	+
Melithreptus lunatus	White-naped Honeyeater	Bird survey	+			
Monarcha melanopsis	Black-faced Monarch	Bird survey	+	+	+	+
Myiagra rubecula	Leaden Flycatcher	Bird survey	+	+	+	
Myzomela sanguinolenta	Scarlet Honeyeater	Bird survey	+	+	+	+
Neochmia temporalis	Red-browed Finch	Bird survey		+		
Ninox novaeseelandiae	Southern Boobook	Spotlighting				+
# *Ninox strenua*	Powerful Owl	Opportunistic record			+	
Pachycephala pectoralis	Golden Whistler	Bird survey	+	+	+	+
Pachycephala rufiventris	Rufous Whistler	Bird survey	+		+	+
Pardalotus punctatus	Spotted Pardalote	Bird survey	+	+	+	+
Pitta versicolor	Noisy Pitta	Bird survey				+
Platycercus eximius	Eastern Rosella	Bird survey		+		+
Psophodes olivaceus	Eastern Whipbird	Bird survey	+	+	+	+
Rhipidura fuliginosa	Grey Fantail	Bird survey	+	+	+	+
Rhipidura rufifrons	Rufous Fantail	Bird survey			+	
Sericornis citreogularis	Yellow-throated Scrubwren	Bird survey			+	+
Sericornis frontalis	White-browed Scrubwren	Bird survey	+	+	+	+
Strepera graculina	Pied Currawong	Bird survey	+	+		
Todiramphus sanctus	Sacred Kingfisher	Bird survey	+	+	+	
Trichoglossus haematodus	Rainbow Lorikeet	Opportunistic record	+			
Zosterops lateralis	Silvereye	Bird survey	+	+	+	+
		Total	33	28	26	24
Terrestrial Mammals						
Antechinus stuartii	Brown Antechinus	Trapping & hair ID	+	+	+	+
Perameles nasuta	Long-nosed Bandicoot	Trapping	+		+	+
Rattus fuscipes	Bush Rat	Trapping	+	+	+	+
Wallabia bicolor	Swamp Wallaby	Opportunistic diurnal sighting			+	
		Total	3	2	4	3

Scientific Name	Common Name	Method	Location			
			Dry forest - 2008	Dry forest - 2009	Rainforest - 2008	Rainforest - 2009
Arboreal Mammals						
Acrobates pygmaeus	Feathertail Glider	Spotlighting	+			
Petauroides volans	Greater Glider	Spotlighting			+	
Petaurus breviceps	Sugar Glider	Spotlighting	+	+		
Trichosurus vulpecula	Common Brushtail Possum	Spotlighting				+
		Total	**2**	**1**	**1**	**1**
Bats						
Chalinolobus gouldii	Gould's Wattled Bat	Anabat analysis	+	+		+
Chalinolobus morio	Chocolate Wattled Bat	Trapping & Anabat analysis	+	+		
Falsistrellus tasmaniensis / Scotorepens orion	Eastern False Pipistrelle / Scotorepens orion	Anabat analysis		+		+
# Miniopterus australis	Little Bentwing-bat	Trapping & Anabat analysis	+	+	+	+
# Mormopterus norfolkensis	Eastern Freetail-bat	Anabat analysis				+
Mormopterus sp. 2						+
Nyctophilus gouldi	Gould's Long-eared Bat	Trapping		+		+
# Pteropus poliocephalus	Grey-headed Flying-fox	Spotlighting	+			
Vespadelus pumilis	Eastern Forest Bat	Anabat analysis	+	+		+
Vespadelus vulturnus	Little Forest Bat	Trapping & Anabat analysis	+	+	+	+
		Total	**6**	**7**	**2**	**8**

# denotes a threatened species under the NSW TSC Act 1995

Appendix 3: Photographs of selected fauna species detected at Long Gully Creek

Arboreal and terrestrial mammals

Common Brushtail Possum (*Trichosurus vulpecula*)

Sugar Glider (*Petaurus breviceps*)

Brown Antechinus (*Antechinus stuartii*)

Bush Rat (*Rattus fuscipes*)

Long-nosed Bandicoot (*Perameles nasuta*)

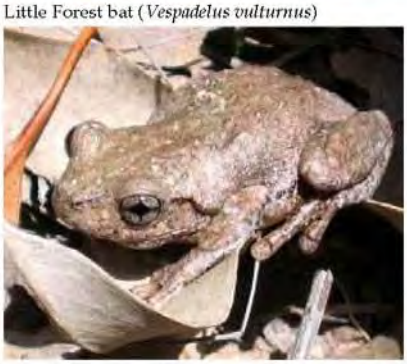
Feathertail Glider (*Acrobates pygmaeus*)

Bats, reptiles, amphibians and birds

Gould's Wattled Bat (*Chalinolobus gouldii*)

Little Forest bat (*Vespadelus vulturnus*)

Gould's Long-eared Bat (*Nyctophilus gouldi*)



Peron's Tree Frog (*Litoria peronii*)

Powerful Owl (*Ninox strenua*)

Lace Monitor (*Varanus varius*)

Appendix 4: Contributions and qualifications of ecobiological staff

Name	Qualification	Title	Contribution
Kristy Peters	B. ParkMgt.	Ecologist (Ornithologist)	Bird surveys, fauna report writing, Anabat analysis
Ryan Parsons	B. Env Sc.	Ecologist (Botanist)	Flora survey and identification, flora report writing
Adam Blundell	B. Env Sc. (Hons)	Senior Environmental Scientist	Fauna hair identification, trap layout and checks, nocturnal fieldwork
Dan Pedersen	B. Sc.	Botanist	Internal report review
David Paull	M. Res. Sc (Masters)	Ecologist (Herpetologist)	Amphibian survey
Dianna Brettschneider	B. App Sc.	GIS Manager	Preparation of map layouts for report