

Appendix 7

2017 T.E.N.T.A.C.L.E. Incorporated Rehabilitation Report

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T.E.N.T.A.C.L.E INC.

The Education Network Training Applying Conserving Landbased Ecosystems

Bushland Regeneration Service

ABN: 39 738 451 129

Coordinator & Director – Christy Woolcock

Treasurer – Sue McDonnell

METROMIX TERALBA BUSH REGENERATION

End of year report

2017



Prepared by Alexander Oates-Power

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INTRODUCTION

The following report details methods and purpose, hours worked, weeds controlled, results, observations and recommendations from bush regeneration work completed by Tentacle Inc. at Teralba Metromix quarry & biodiversity offset/Biobanking area.

BACKGROUND

Works by Tentacle Incorporated were carried out in accordance with all current applicable legislation including:

- Environmental Protection and Biodiversity Conservation Act 1999
- Pesticides Act 1995
- Protection of Environment Operations Act 1997
- National Parks and Wildlife Act 1974
- Threatened Species Conservation Act 1995
- Lake Macquarie City Councils Local Environmental Plan 2012

All works were compliant with the conditions of the National Parks and Wildlife Services checklist, for bush regeneration activities in the habitat of threatened species, endangered populations and endangered ecological communities.

Bush regeneration techniques applied were conformed to the best practice guidelines outlined within the Bush Regenerators handbook (National Trust of Australia, NSW 1991).

The rehabilitation works aim to improve the overall natural condition of the site by controlling invasive weed species. The rehabilitation of native vegetation will increase biodiversity within the designated area. Improved native vegetation communities will also protect waterways from increased sedimentation by enhancing erosion control and protecting and conserving the habitat for native and threatened flora and fauna.

The works will improve the overall site condition encouraging an increase in native biodiversity.

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AIMS

The aims of the project are to restore and maintain ecosystem health by aiding the natural regeneration of indigenous plants and their communities. To manage the habitat for increased native biodiversity across the site by reducing the population and abundance of weed species.

These works are performed in the best interest of Metromix's BioBanking initiative by maintaining areas of healthy vegetative status and improving those that are degraded.

The aims of the project were to reduce noxious weeds, Environmental weeds, Weeds of National Significance and target weeds that were identified by the Tentacle team.

Target species this year have been:

Lantana (<i>Lantana camara</i>)	Camphor Laurel (<i>Cinnamomum camphora</i>)
Crofton weed (<i>Ageratina adenophora</i>)	Asparagus Fern (<i>Asparagus aethiopicus</i>)
Pampas grass (<i>Cortaderia selloana</i>)	Ochna (<i>Ochna serrulata</i>)
Wild tobacco (<i>Solanum mauritianum</i>)	Cassia (<i>Senna pendula</i> var. <i>glabrata</i>)
Narrow-leaf Privet (<i>Ligustrum sinense</i>)	Bitou bush (<i>Chrysanthemoides monilifera</i>)

OBJECTIVES

The Objectives of the project are to remove the target weed species allowing the increase of biodiversity of endemic species using industry standard bush regeneration techniques for when topsoil is taken and stored there will be a healthy soil seed bank for later use in the rehabilitation proses undertaken by Metromix. To continually maintain and monitor areas that have been previously weeded and to improve the zones categorized by Eco Logical Australia in their Biobank Agreement Credit Assessment report of 2014. To plant 8160 assorted native plant species as part of Metromix's rehabilitation program to reestablish the previously mined areas to their former state.

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HOURS WORKED

A total of **1103.5** hours have been worked at Metromix Teralba by the Tentacle Inc. staff performing environmental restoration and bush regeneration activities over 2017.

HERBICIDE USED

A total of **5.75** Liters of Roundup Biactive® Herbicide has been used for the treatment of woody and other environmental weeds this year. Roundup Biactive® Herbicide was selected as the preferred form of chemical control as it designed to be used in environmentally sensitive areas.

METHODS

In order to successfully remove the wide range of weed species on the site, several bush regeneration techniques were used.

These techniques were chosen based on 3 main basis:

- Success of destroying the plant
- Time taken to conduct the required technique
- Impacts the method will have on a the surrounding native flora and fauna

These methods chosen to remove weeds include:

- The use of the cut/scrape and paint, splatter gun/spraying chemical weed control via the application of Roundup Biactive® Herbicide
- Hand removal (Hand pulling, Crowning)
- Seed head removal

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OBSERVATIONS

A number of observations have been made this year by the Tentacle team to give an idea of the diverse fauna living in the area.

These Species include:

Birds

Common Name	Scientific name
Australian Brushturkey	<i>Alectura lathami</i>
Brown cuckoo-dove	<i>Macropygia amboinensis</i>
Spotted Pardalote	<i>Pardalotus punctatus</i>
Golden Whistler	<i>Pachycephala pectoralis</i>
White Bellied Sea Eagle	<i>Haliaeetus leucogaster</i>
Eastern Whipbird	<i>Psophodes olivaceus</i>
White-browed scrubwren	<i>Sericornis frontalis</i>
Wedge-tailed Eagle	<i>Aquila audax</i>
White-headed pigeon	<i>Columba leucomela</i>
Sulphur-crested cockatoo	<i>Cacatua galerita</i>
Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Australian Raven	<i>Corvus coronoides</i>
Masked Plover	<i>Vanellus miles</i>
Yellow-tailed black cockatoo	<i>Calyptorhynchus funereus</i>
Australian Magpie	<i>Cracticus tibicen</i>
Hawk	(Unidentified)



Figure 1: Photo of a Joseph's coat moth caterpillar (*Agarista agricola*)
Date taken: 9/05/2017

Reptiles

Common Name	Scientific name
Marsh Snake	<i>Hemiaspis signata</i>
Red-bellied black snake	<i>Pseudechis porphyriacus</i>
Jacky Dragon	<i>Amphibolurus muricatus</i>



Figure 2: Photo of a Swamp wallaby (*Wallabia bicolor*)
Date taken: 10/05/2017

Marsupials

Common Name	Scientific name
Swamp Wallaby	<i>Wallabia bicolor</i>
Brown Antechinus	<i>Antechinus stuartii</i>
Ringtail Possum	<i>Pseudocheirus peregrinus</i>
Long-nosed bandicoot	<i>Perameles nasuta</i>

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Tetratheca

The endemic *Tetratheca jencea* that were translocated in 2015 are continuing to survive with no new reported deaths, 75% of the original recorded populations still being alive.



Figure 3: *Tetratheca jencea* - Date taken: 16/11/2017

Dipodium

While examining the Tetratheca, the Tentacle team came across 5 plants of *Dipodium variegatum* flowering, a native orchid found along the east coast of New South Wales.



Figure 4: *Dipodium variegatum* flowering in the Tetratheca translocation area. - Date taken: 16/11/2017

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BUSH REGENERATION

Approximately 86800m² has been worked this year in the removal of weeds such as Lantana, Pampas grass and Privet, creating a more sustainable ecosystem within the treated areas. Sections of Lantana were treated with the use of a splatter gun which has had a 95% success rate in the treated areas, allowing to more easily access areas that were previously unaccessible.

Two days were spent removing Pampas grass from the mining grounds as the plant has the ability to produce 100,000 windborne seeds per flower head. All seed heads were bagged then removed from site, then treated with Glyphosate. 100% of the Pampas grasses treated have been successfully killed.

One day was spent at the Nelson Bay sand quarry to splatter gun and spray two large sand dunes and surrounding areas that were infested with Bitou bush (*Chrysanthemoides monilifera*).

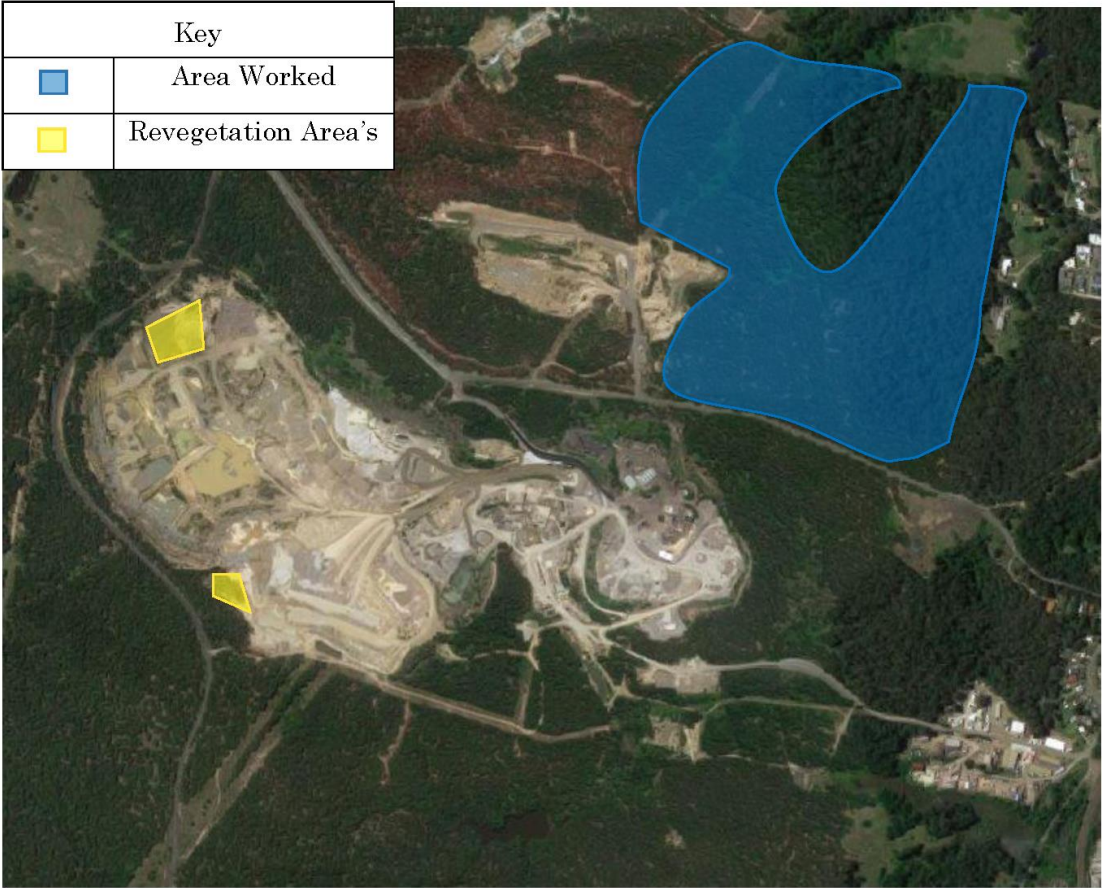


Figure 5: One of the sand dunes that were splatter gunned to treat Bitou bush at the Nelson Bay sand quarry. Date taken: 7/08/2017

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AREAS WORKED

Map	This map depicts the Areas worked in 2017.
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REVEGETATION

A total of 8160 assorted trees, shrubs and grass species were planted in the revegetation areas marked on the site map as a part of Metromix's rehabilitation program to reestablish the areas to their former state. Revegetating the areas previously mined helps to revitalize habitats and increases the strength of the ecosystem thus creating a more diverse environment for native fauna. Hydraflo wetting agent was used to aid in the rewetting of the soil as it eliminates localized dry spots and increases the uniformity of wetting throughout the soil profile. All plants have shown great success with a 95% survival rate since the planting commenced.



Figure 6: Bottom revegetation area after all plants have been planted.
Date taken: 13/12/2017

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Species Planted

Trees

Plant Species	Number Planted
<i>Corymbia maculata</i>	120
<i>Eucalyptus acmenoides</i>	120
<i>Eucalyptus paniculata</i>	120
<i>Eucalyptus umbra</i>	120
<i>Eucalyptus punctata</i>	120

Shrubs

Plant Species	Number Planted
<i>Angophora costata</i>	120
<i>Acacia implexa</i>	200
<i>Acacia ulicifolia</i>	200
<i>Podolobium ilicifolium</i>	200

Grasses

Plant Species	Number Planted
<i>Entolasia stricta</i>	1848
<i>Imperata cylindrica</i>	1800
<i>Themeda australis</i>	3192

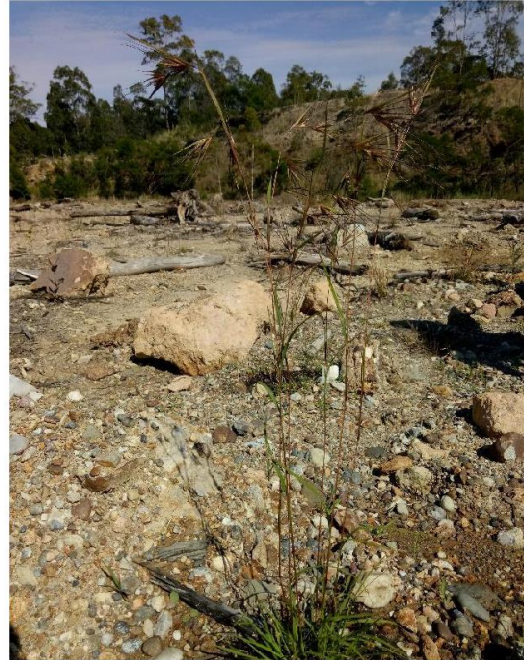


Figure 7: A healthy *Themeda australis* that is seeding.
Date taken: 16/11/2017



Figure 8: Before photo of the 8160 plants in their tubes.
Date taken: 25/09/2017

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CONCLUSION

In conclusion the aim and objectives have been met, the removal of target weed species allowing the increase of biodiversity of endemic species has been achieved. A great deal of Lantana and other target weeds have been cleared this year, creating a more sustainable ecosystem within the treated areas.

Large areas of Lantana will need to be treated with the use of a splatter gun next year as the areas are primarily Lantana with minimal natives. Secondary weeding will need to be done next year in the areas worked to insure that Lantana does not have the chance to reestablish in the clears zones. The sand quarry at Nelson Bay may need secondary weeding to make sure Bitou bush (*Chrysanthemoides monilifera*) does not retake the areas treated.

The planting of 8160 various plants was successful with only 5% of losses, continuous watering will need to be done until the plants have better established to prevent any deaths. Weeding will need to be done in the large bottom section of the revegetation area as weeds have already started to emerge, weeding will give a better chance to the planted natives to survive, giving them more room to expand and not have to compete with the weeds.

The *Tetratheca juncea* that were transplanted have continued to thrive with no new reported deaths. Further monitoring will be completed in the future to see whether it has populated the surrounding areas and to see whether any deaths have occurred.

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PHOTO DOCUMENTATION



Figure 9: Before photo of the bottom revegetation area.
Date taken: 25/09/2017



Figure 10: After photo of the bottom revegetation area.
Date taken: 13/10/2017

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Figure 11: After photo of the top shelf of the southern revegetation area.
Date taken: 16/11/2017



Figure 12: After photo of the bottom shelf of the southern revegetation area.
Date taken: 16/11/2017

2017 Plantings – Teralba Quarry

Numbers	Species
	Trees
120	Spotted Gum
120	White Mahogany
120	Grey Ironbark
120	Broad Leaf White Mahogany
120	Grey Gum
	Shrubs
120	Smooth Bark Apple
200	Hickory Wattle
200	Prickly Moses
200	Shaggy Peas
	Grasses
1848	Wiry Panic
1800	Blady Grass
3192	Kangaroo Grass

NC JUPP & VF JUPP t/a Riverdene
80 Allyn River Road
East Gresford NSW 2311
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DELIVERY DOCKET - CUSTOMER COPY

ABN 57 487 712 097		DATE 01-Mar-2017	INVOICE NO 5528
INVOICE TO Tetracle Incorporated c/ Christy Woolcock		PROJECT ORDER No	mETROMIX
		REFERENCE revised 10/10/2016 for Autumn 2017	

DESCRIPTION	Available Stock	QTY Supplied	Delivery Date
ASSORTED TREES SPECIES (MINI TUBES) X 600			
CORYMBIA MACULATA TUBES	120	120	
EUCALYPTUS ACMENOIDES TUBES	120	120	
EUCALYPTUS PANICULATA TUBES	120	120	
EUCALYPTUS UMBRA TUBES	120	120	
EUCALYPTUS PUNCTATA TUBE	120	120	
ASSORTED SHRUB SPECIES (MINI TUBES) X 720			
ANGOPHORA COSTATA TUBE	120	120	
ACACIA IMPLEXA TUBE	200	200	
ACACIA ULICIFOLIA TUBES	200	200	
PODOLOBIUM TUBE POTS	200	200	
GRASSES X 6840 MINI TUBES			
ENTOLASIA STRICTA TUBES	1848	1,848	
IMPERATA CYLINDRICA TUBES	1800	1,800	
THEMEDA AUSTRALIS TUBES	3192	3,192	
HYDRAFLO	2	2	

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