



## Report prepared by Bruce Macpherson, Conservation and Land Management, Forestec

### Introduction

Gippsland Lakes fringing vegetation has and still is being threatened by a number of factors, including introduced species of herbivores, particularly pigs and Hog Deer. “Although ecological studies are limited, severe damage caused by Hog Deer has been confirmed in natural rainforest and on rainforest restoration sites. Browsing and antler-rubbing has been responsible for killing young saplings of preferred species such as Black Wattle, varnish Wattle, Blackwood, Kangaroo Apple and Yellowwood, preventing their regeneration and, in some areas, resulting in the alteration of plant community composition and structure” (Bilney & Bilney 2008).

In a post fire survey in 2010 *Acacia terminalis* (Sunshine Wattle) and *Banksia serrate/integrifolia* (Saw Banksia/Coastal Banksia) seedlings were recorded and three study sites were established to monitor their growth and survival. *Acacia terminalis* is a fast growing, open spreading shrub of 2-3 meters in height, but is reported to be short lived due to attack by borers (ANPSA 2010). It was also noted that *Acacia terminalis* does not respond well to hard pruning (Wildseed Tasmania 2010) which could occur from severe impacts of browsing.

The purpose of this study is to monitor the survival and growth rate of *Acacia terminalis* and *Banksia serrate/integrifolia* seedlings after a prescribed burn in 2010 on an area of Boole Poole Peninsula managed by Parks Victoria.

### Method

At each of the three sites a 5 meter x 5 meter plot was established. A permanent corner peg with a metal tag referenced B1, B2 or B3 gave the starting point. A GPS reading was recorded for each starting point and each plot followed site specific compass bearings (refer below). All *Acacia* and *Banksia* seedlings found within each plot were recorded as was maximum height. Surveys were undertaken on the 14<sup>th</sup> November 2011 and the 7<sup>th</sup> November 2012.

Photos were taken at each site as was a general species list. At site B1 three tree guards were placed around *Acacia* and *Banksia* seedlings to be used as reference points.

Plot B1: GPS: 55 0577802 -5805464. Compass bearing from starting peg: 300°, 210°, 120°, 30°.

Plot B2: GPS: 55 0578463 -5803773. Compass bearing from starting peg: 60°, 330°, 240°, 150°.

Plot B3: GPS: 55 0577682 -5803631. Compass bearing from starting peg: 180°, 270°, 360°, 90°.

## Findings

In 2011 site B1 recoded a total of 21 *Banksia integrifolia/serrata* and 7 *Acacia terminalis* seedlings. The *Banksia* seedlings were up to 200mm tall and the *Acacias* up to 100mm tall. All showed signs of some browsing.

In 2012 site B1 recorded 17 *Banksia integrifolia/serrata* and 10 *Acacia terminalis* seedlings. The *Banksia* seedlings were up to 140mm tall and the *Acacias* up to 100mm tall. All showed signs of some browsing.

Overall for site B1 there were 4 less *Banksia integrifolia/serrata* seedlings (19% loss) and an increase of 3 *Acacia terminalis* seedlings (30% increase). *Banksia integrifolia/serrata* maximum height decreased by 60mm (30% drop) and *Acacia terminalis* seedlings recorded no change.

In 2011 site B2 recoded a total of 0 *Banksia integrifolia/serrata* and 19 *Acacia terminalis* seedlings. The *Acacia* seedlings were up to 150mm tall. All showed signs of some browsing.

In 2012 site B2 recoded a total of 1 *Banksia integrifolia/serrata* and 17 *Acacia terminalis* seedlings. The *Banksia* seedling was 10mm and the *Acacia* seedlings were up to 340mm tall (average 100mm). All showed signs of some browsing.

Overall for site B2 a single *Banksia integrifolia/serrata* seedling was recorded compared to 0 in 2011 (100% gain) and a decrease of 2 *Acacia terminalis* seedlings (10% decrease). *Acacia terminalis* seedlings recorded 190mm increase in maximum height (56%) although the average was less than that recorded in 2011.

In 2011 site B3 recoded a total of 28 *Banksia integrifolia/serrata* and 0 *Acacia terminalis* seedlings. The *Banksia* seedlings were up to 250mm tall. All showed signs of some browsing.

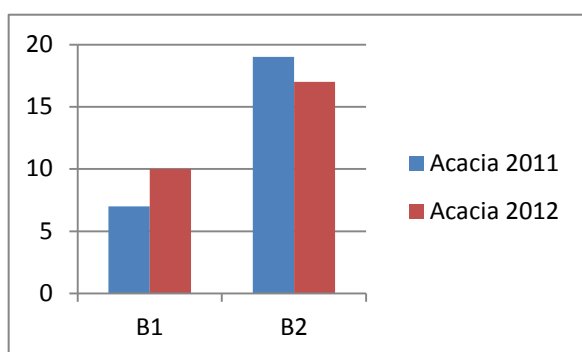


Reference *Acacia terminalis*  
Photo: Maurice Burns

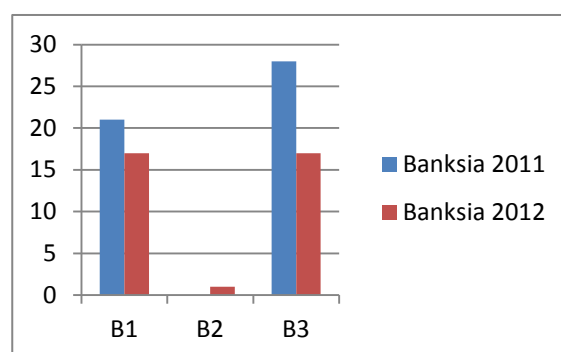
In 2012 site B3 recoded a total of 17 *Banksia integrifolia/serrata* and 0 *Acacia terminalis* seedlings. The *Banksia* seedlings were up to 300mm tall. All showed signs of some browsing.

Overall for site B3 there were 11 less *Banksia integrifolia/serrata* seedlings recorded (39% decrease) as with 2011 no *Acacia terminalis* seedlings were recorded. *Banksia integrifolia/serrata* maximum height increased by 50mm (17% increase).

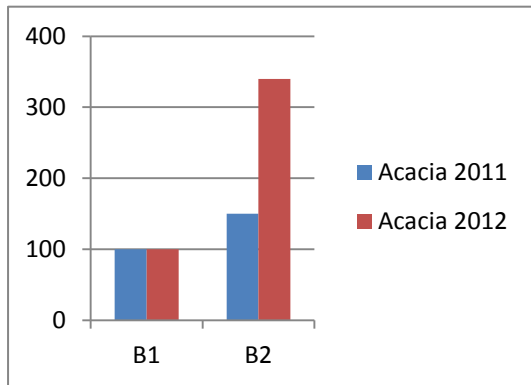
The reference *Acacia terminalis* seedling protected by the tree guard showed a growth rate of 89% from 100mm in 2011 to 920mm in 2012.



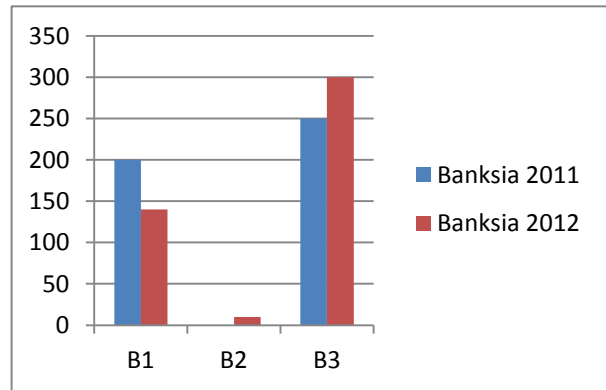
Total numbers of *Acacia terminalis*



Total numbers of *Banksia serrata/integrifolia*



Maximum acacia heights in mm per site



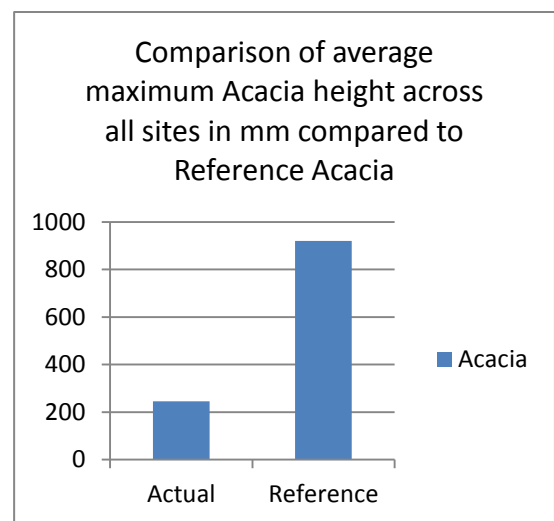
Maximum banksia height in mm per site

### Conclusion

All three sites showed effects of grazing on seedling development and there was evidence of some new recruitment since 2011 which may be a result of favourable weather conditions.

Although the results showed increases and decreases in total numbers of seedlings across the study sites, there are many variables that were not measured that could account for this including competition, extreme weather conditions and insect attack.

The more important finding is that on the seedling growth rate over the one year period. Although there was a slight increase, the overall growth rate is not what would be expected, especially for *Acacia terminalis* which is noted as a fast grower. This fact is highlighted by the reference acacia at site B1 which had grown 820mm in just under a year compared to the plot B1 acacia's that showed no growth over the same period.



From this we can draw a conclusion that browsing is having a direct effect on seedling development, unfortunately though we have no evidence of what is causing the browsing.

### Recommendations

Establish more single tree guards around seedlings so more precise statistical analysis can be performed on growth rates. Because we can conclude that browsing pressure is impacting on the development of seedlings we need to now concentrate on monitoring and recording the herbivore species responsible, the most logical and cost efficient method is through the installation of remote cameras.

### Appendices

All species list prepared by **James Turner**

## References

Bilney, R. J. and Bilney, R. J. (2008) In: *The Mammals of Australia* (Third Edition). Van Dyck, S. and Strahan, R. eds. Reed New Holland, Australia. (p 781-782)

Australian Native Plant Society Australia (2010) *Acacia terminalis*. Retrieved from <http://anpsa.org.au/a-ter.html>

Wildseed Tasmania (2010) *Acacias*. Retrieved from [http://www.wildseedtasmania.com.au/acacia.php#Acacia\\_terminalis](http://www.wildseedtasmania.com.au/acacia.php#Acacia_terminalis)

<b>FLORA LIST FOR SITE LOCATIONS ON BOOLE POOLE</b>	<b># = 23-5-2011 X = 14-11-2011 Ø = 7-11-12</b>					
<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>SOUTH SLOPE</b>	<b>RIDGE TOP</b>	<b>SITE B (B1)</b>	<b>SCRUB SITE (B2)</b>	<b>NORTH SLOPE (B3)</b>
Acacia longifolia subsp. sophorae	Coast Wattle			#		
Acacia terminalis	Sunshine Wattle	#	#	# X Ø	# X Ø	#
Acianthus exsertus	Large Mosquito Orchid	#				
Acrotriche serrulata	Honey-pots (Heath species ( seedlings)				X Ø	
Allocasuarina verticillata	Drooping Sheoak		#			
Aotus ericoides	Common Aotus			# X Ø		
*Aria cupaniana	Hair-grass			Ø		Ø
Austrodanthonia setacea var. setacea	Bristly Wallaby-grass				Ø	X Ø
Banksia integrifolia	Coast Banksia	#	#	Ø (seedling)		# X Ø
Banksia serrata	Saw Banksia	#	#	# X Ø	# X Ø	# X Ø
Bossiaea cinerea	Showy Bossiaea			X Ø		
Caladenia species (? leaf)	Fingers Orchid				# X	
Carpobrotus rossii	Karkalla - pigface		#	#		# X
*Centaurium erythraea	Common Centaury					Ø
Clematis glycinoides (seedling)	Forest Clematis				Ø	
Corybas fimbriatus	Fringed Helmet-orchid	#			# X Ø	
Crassula sieberiana	Stonecrop			Ø		# X Ø
Daucus glochidiatus	Austral Carrot					X Ø
Desmodium gunnii	Southern Tick-trefoil				# Ø	Ø
Dichondra repens	Kidney-weed					Ø
Drosera peltata subsp.peltata	Sundew				# X	
Eucalyptus botryoides	Southern Mahogany	#	#	?	# X Ø	# X Ø
Eucalyptus viminalis ssp. pryoriana	Manna Gum			# X Ø		
Euchiton sphaericus	Star Cudweed					X Ø
Ficinia nodosa	Knobby Club-rush				Ø	Ø
Galium propinoquum	Maori Bedstraw	#	#	# Ø	# X Ø	# X Ø
Glycine clandestina	Twining Glycine	#		Ø	# X Ø	# X Ø
Gonocarpus teucroides	Raspwort	#		X Ø	# X Ø	# X Ø
Hydrocotyle hirta	Hairy Pennywort					Ø

*Hypochoeris radicata	Flatweed				# ∅	# X∅
Imperata cylindrica	Bladey Grass					X
Juncus planifolius	Broad-leaf Rush					X ∅
Kennedia prostrata	Running Postman			∅		# X ∅
Kunzea ericoides sp. Agg.	Burgan			X ∅	# X ∅	# X ∅
Lagenophora stipitata	Blue Bottle-daisy	#			# X ∅	∅
Lepidosperma concavum	Sandhill Sword-sedge	#	#	# X ∅	# X ∅	# X ∅
Leptospermum laevigatum	Coast Tea-tree			# X ∅	# X ∅	∅
Lomandra longifolia	Spiny-headed Mat-rush	#	#	# X ∅	# X ∅	# X ∅
Monotoca elliptica	Coast Broom Heath	#	#	# X ∅	# X ∅	# X ∅
Olearia lirata	Snow Daisy-bush					X ∅
Opercularia varia	Variable Stink-weed					∅
Pimelea humilus	Small Rice-flower					#
Poa species	Tussock Grass				X ∅	
Poranthera microphylla	Small Poranthera	#		∅	∅	# X ∅
Pteridium esculentum	Common Bracken	#	#	# X ∅	# X ∅	# X ∅
Ranunculus sessiliflorus var. sessiliflorus	Small-flower Buttercup	#			#	
Rhagodia candolleana subsp.candolleana	Seaberry Salt Bush					∅
Senecio hispidulus var. hispidulus	Rough Fire-weed					∅
Senecio sp.	Fireweed	#			∅	# X
Solanum prinophyllum	Forest Nightshade	#			# X	
Stackhousia monogyna	Creamy Candles				# X ∅	
Stellaria pungens	Prickly Starwort					X ∅
Veronica plebeia	Trailing Speedwell					∅
Viola hederacea	Ivy-leaf Violet	#			# X ∅	
Walanbergia gracilis	Sprawling Bluebell					# X ∅
* = Introduced weed						