

Conservation Action Planning Framework – Forest to Stirlings Functional Landscape

Summary of key Conservation Action Planning work in the Forest to
Stirlings area of Gondwana Link



Recently fenced bushland near Geekabie Hill, Stirling range outlier, near Cranbrook

Version (v31 March 2011)

DRAFT Conservation Action Planning Framework – Forest to Stirlings Functional Landscape
Summary of key Conservation Action Planning work in the Forest to Stirlings area of Gondwana Link. Draft of 31 March 2011
 (prepared by Barry Heydenrych and others ph 0427 988 024 or email barryh@gawa.org.au)

Draft Vision for the Forest to Stirlings Functional Landscape:

To enhance ecological connectivity and ecosystem health between the Walpole Wilderness Area and the Stirling Range National Park for the purposes of biodiversity conservation in the predominantly agricultural landscape.

Background

Between September 2010 and March 2011, a number of meetings to develop a Conservation Action Plan (CAP) (TNC, 2007) for the Forest to Stirlings area were undertaken by a small working group comprising Basil Schur (Green Skills), Wendy Bradshaw (South Coast NRM), Sylvia Leighton (Land for Wildlife), Keith Bradby (Gondwana Link), Barry Heydenrych (Greening Australia/Gondwana Link) and Bill Hollingsworth (Horticulture, Forestry & Wilson Inlet Catchments Council), Genevieve Harvey (Gillamii Centre) & Geoff Rolland (Albany Plantation Forest Company of Australia) and reporting back to a wider group of stakeholders was also undertaken. Gondwana Link assisted Green Skills & the Gillamii Centre to produce this Conservation Action Planning Framework for the Forest to Stirlings Functional Landscape and is very appreciative of the assistance of all individuals and organisations involved.

Aim

The broad aim of the CAP is to develop a “rapid and robust” plan for improving conservation values across the landscape, by adding value to the NRM efforts currently underway in this important biodiversity “hotspot” and by providing a framework for leveraging more funds for on-ground works.

Area

The “Forest to Stirlings” landscape was developed primarily by buffering areas around “macro-corridor” linkages (Wilkins et. al., 2006) and incorporating important wetlands (Hopkinson 2003; Hopkinson, 2005), forming a roughly 70km long area of approximately 266,000 ha between the Walpole Wilderness Area (Mt Roe National Park) to the west and the Stirling Range National Park to the east. (See Figure 1 below). The area and its borders are therefore flexible, but for the purposes of developing this plan, the current borders encompass the key ecological features of the area.

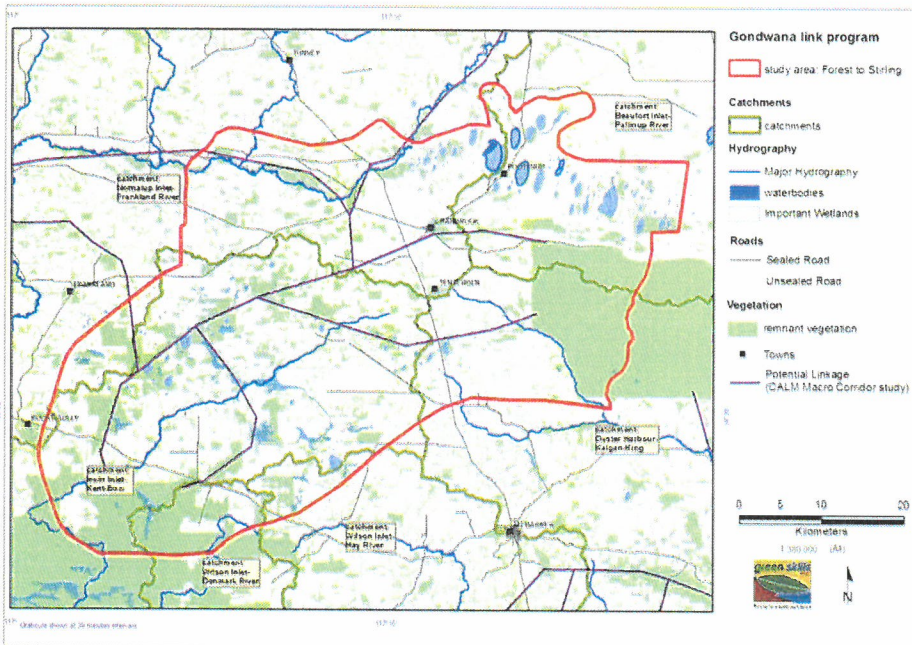


Figure 1. Map showing area of focus for Forest to Stirlings Conservation Action Planning

The area crosses a steep rainfall gradient (approximately 750mm in the west to 450mm in the east), comprises a number of vegetation types from forest through to mallee-heath with a range of significant wetlands and associated vegetation communities & fauna. In addition, the area has been shown to have a high plant species richness – as depicted in figure 2. The Forest to Stirlings landscape area is at the junction of a number of catchments flowing in different directions and encompasses the end of the ranges of a number of species and the Albany Highway approximates an east west boundary for some species. The western part of the area has a high representation of plantation forestry properties, many of which contain important remnant vegetation and associated fauna.

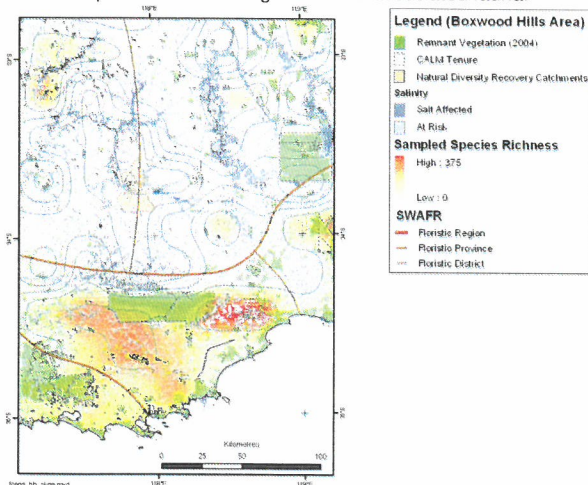


Figure 2. Isoflor map showing plant species richness – note the darker orange/red areas to the west of the Stirling Range National Park (from the work of Prof. Steven Hopper and Dr Paul Gioia)

Targets

Step one of the process of developing a CAP is the selection of a few key focal conservation targets that best represent the biodiversity of the area (TNC, 2007). The following targets and "nested" targets were chosen for the Forest to Stirlings area, some of which are depicted spatially in the figures below, with some additional figures and statistics presented in Appendix 1..

Project and Conservation Targets	
Project	Forest to Stirlings
Target #1	Upper Kent Wetland Suite
Nested Target # 1	Migratory birds
Nested Target # 2	Eucalyptus occidentalis/Sedges
Nested Target # 3	Riparian zone
Nested Target # 4	Macro invertebrates, marron & long neck turtle
Target #2	Wandoo associated vegetation communities
Nested Target # 1	Proteaceous rich woodlands associated with gravel
Nested Target # 2	Critical weight range mammals
Nested Target # 3	Carpet Python
Target #3	Proteaceous rich shrublands/woodlands
Nested Target # 1	Gordon River Vegetation Complex
Nested Target # 2	Critical weight range mammals
Target #4	Black gloved wallaby
Nested Target # 1	Leguminous understorey
Target #5	Jarrah/Marri associated vegetation communities
Nested Target # 1	Critical weight range mammals
Target #6	Carnaby's black cockatoo
Nested Target # 1	Baudin's Black Cockatoo
Nested Target # 2	Red Tailed Black Cockatoo
Nested Target # 3	Proteaceous communities
Target #7	Stirling Range outliers
Nested Target # 1	Proteaceous rich shrublands/woodlands
Nested Target # 2	Square tailed & black shouldered kite
Target #8	West Balicup Wetland Suite
Nested Target # 1	Migratory birds
Nested Target # 2	Eucalyptus occidentalis
Nested Target # 3	Riparian zone
Nested Target # 4	Proteaceous rich shrublands

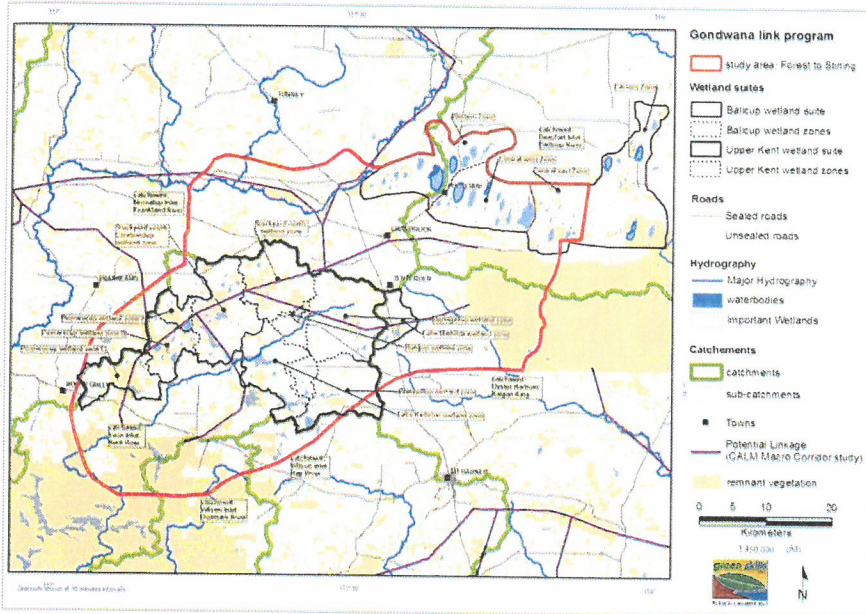


Figure 3. Map showing the occurrences of wetland targets of the Upper Kent and West Balicup

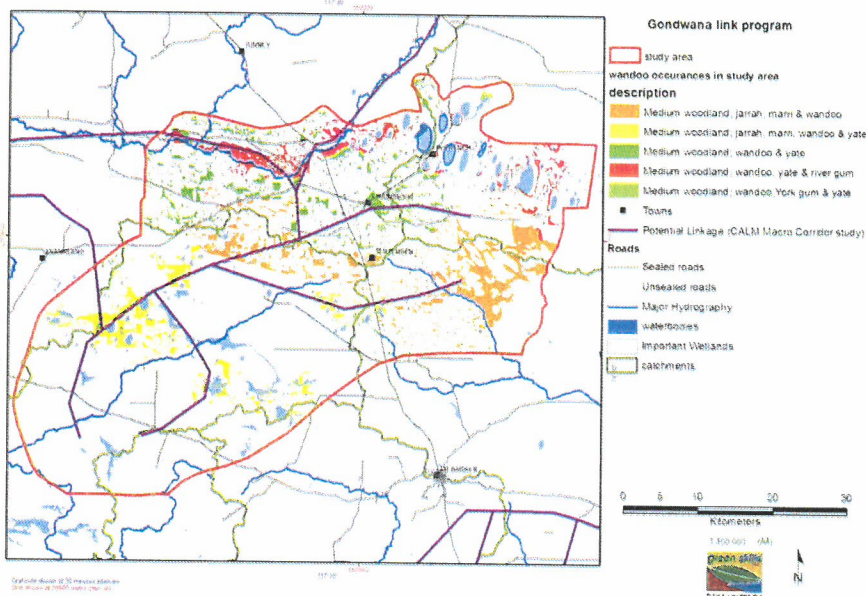


Figure 4. Map showing the occurrences of Wandoo associated vegetation, based on existing vegetation mapping (Beard)

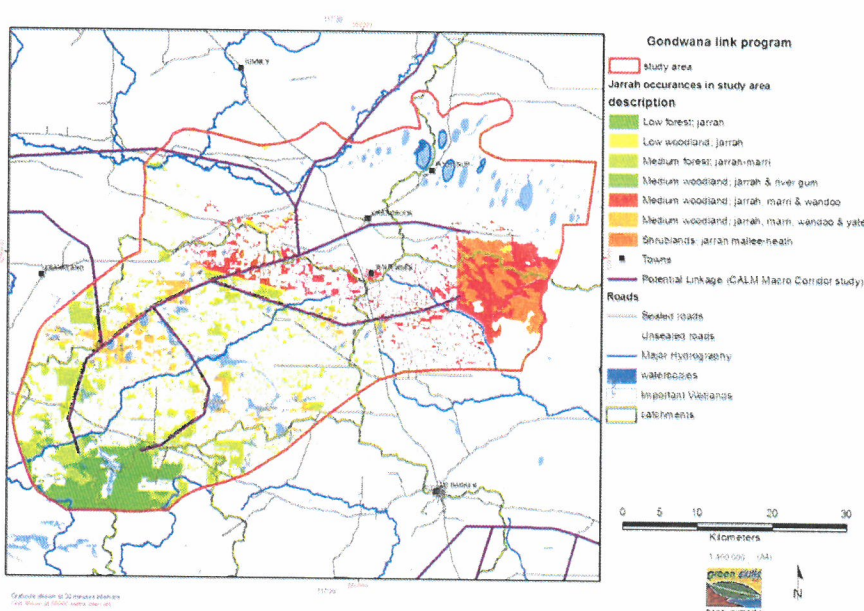


Figure 5. Map showing the occurrences of Jarrah/Marri associated vegetation communities, based on existing vegetation mapping.

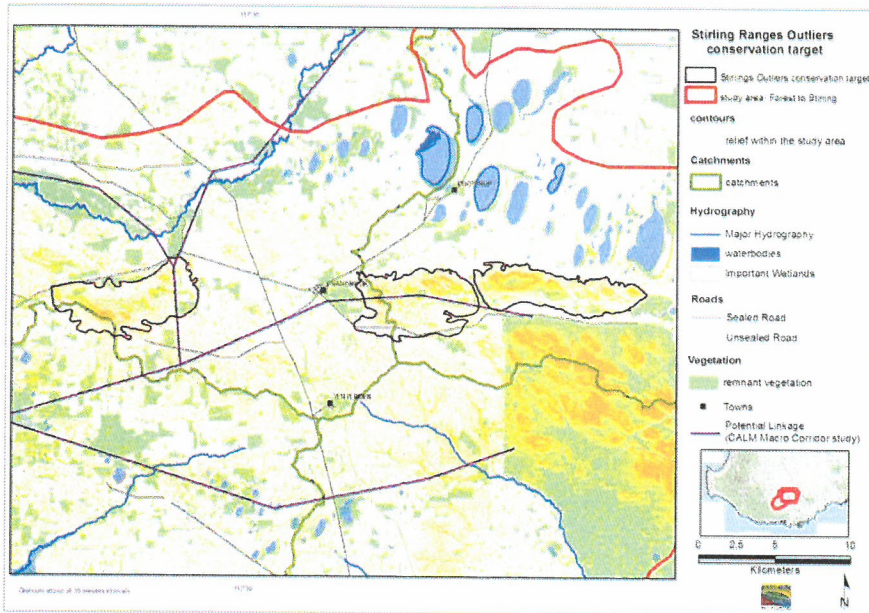


Figure 6. Map showing areas in which Stirling Range outliers vegetation occurs.

Viability of targets (An estimation of the current condition of the targets and how feasible or easy it will be to improve this condition). During the meetings to date viability assessments have been made for the targets, with most targets and the overall biodiversity health of the Forest to Stirlings landscape having been ranked as "fair".

Table 1. Summary of target viability for the Forest to Stirlings Functional Landscape.

Conservation Targets		Landscape Context	Condition	Size	Viability Rank
	Current Rating				
1	Upper Kent Wetland Suite	Fair	Fair	-	Fair
2	Wandoo associated vegetation communities	Fair	Fair	Poor	Fair
3	Proteaceous rich shrublands/woodlands	Fair	Fair	-	Fair
4	Black gloved wallaby	Fair	-	Poor	Fair
5	Jarrah/Marri associated vegetation communities	Fair	Fair	Fair	Fair
6	Carnaby's black cockatoo	Fair	Fair	Poor	Fair
7	Stirling Range outliers	Good	Good	-	Good
8	West Balicup Wetland Suite	Fair	Fair	-	Fair
Project Biodiversity Health Rank					Fair

Threats

The threats to the targets were then examined during a two stage process which identified the stresses to targets and then the "sources" of these stresses. 21 project-specific threats to the target biodiversity have been identified with climate change, fragmentation, wildfire, phytophthora and loss of food resources for Carnaby's black cockatoo being the highest ranked to date.

Table 2. Summary of threats for different targets in the Forest to Stirlings Functional Landscape

Threats Across Targets		Upper Kent Wetland Suite	Wandoo associated vegetation communities	Proteaceous rich shrublands/woodlands	Black gloved wallaby	Jarrah/Marri associated vegetation communities	Carnaby's black cockatoo	Stirling Range outliers	West Balicup Wetland Suite	Overall Threat Rank
Project-specific threats		1	2	3	4	5	6	7	8	
1	Climate change	High	High	High	Medium	High	Very High	Medium	Medium	Very High
2	Fragmentation due to historical clearing	High	High	High	High	Medium	Very High	Medium		Very High
3	Wildfire	Medium	High	High	Medium	Medium	High	Low	Low	High
4	Loss of food sources within foraging distance of nesting sites						Very High			High
5	Phytophthora		Medium	High		High		Low		High
6	Current Clearing (development, infrastructure, farming)	Low	Medium		High	Medium				Medium
7	Clearing induced hydrological change	High	Medium						Medium	Medium
8	Current Removal of Paddock Trees		Medium				High			Medium
9	Grazing (rabbits, roos, livestock & feral pigs)	Medium	Medium	Medium	Medium	Medium	Low	Low	Low	Medium
10	Competition for hollows		Low				High			Medium
11	Marri canker					High				Medium
12	Weeds	Low	Medium	Medium	Low	Medium	Low	Low	Medium	Medium
13	Carnivores (foxes, cats, pigs, kookaburras)		Medium		Medium		Medium			Medium
14	Deaths by vehicles				Medium		Medium			Medium
15	Prescribed burning (current practices)		Low			Medium				Low
16	Barriers (fences, roads)				Medium					Low
17	Farming practices			Medium						Low
18	Loss of mycovores (Woylies & quenda)		Medium							Low
19	Shooting by orchadists and farmers						Medium			Low
20	Water abstraction	Medium								Low
21	High water use by plantation forests	Low				Low		Low		Low
Threat Status for Targets and Project		High	High	High	High	High	Very High	Medium	Medium	Very High

Strategies

The strategies are being developed with the assistance of conceptual models to show linkages between targets and threats, opportunities and impediments (indirect threats) and strategies. See diagram below:

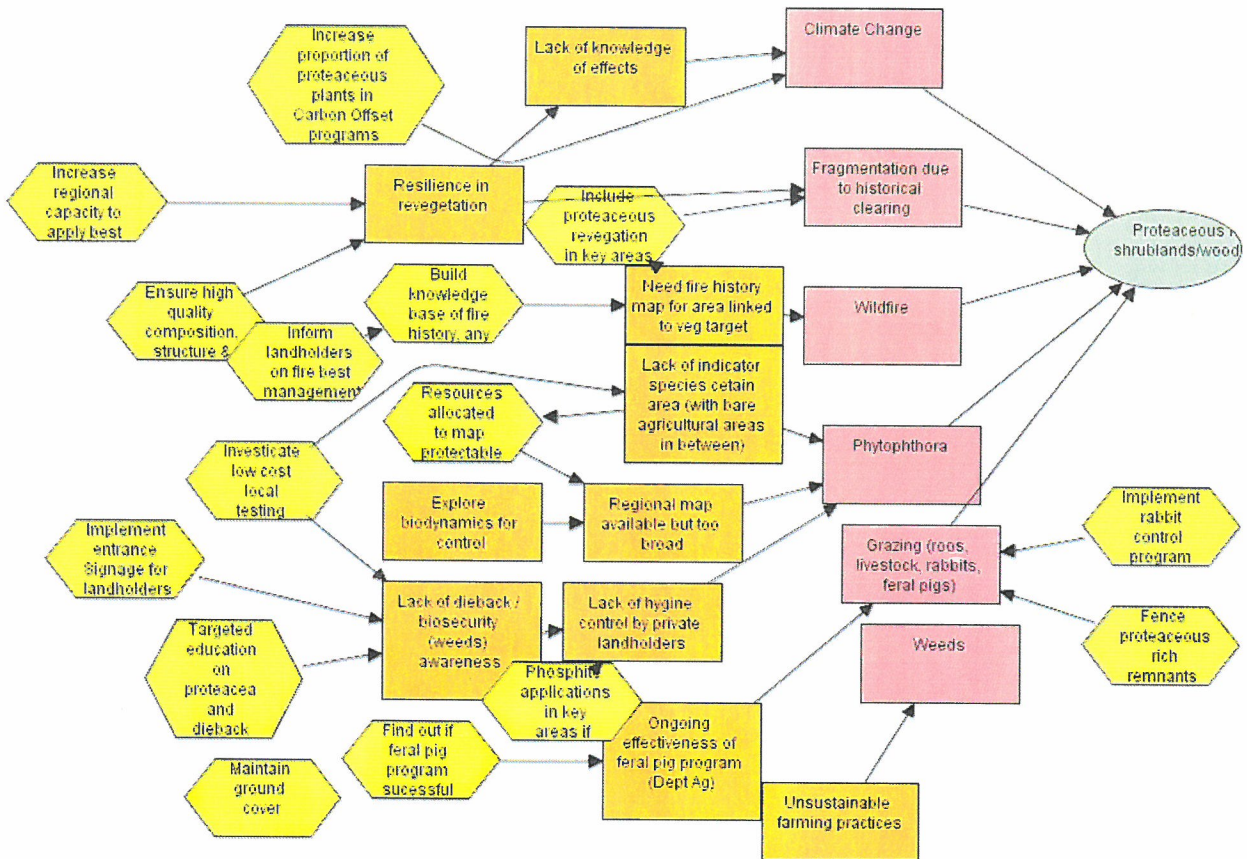


Figure 7. Conceptual model for the Proteaceous Rich Shrublands/Woodlands

During the strategy setting part of the process it was acknowledged that more information is needed for some of the targets, and some of these requirements have been brought into the strategies below. The Proteaceous Rich Shrubland/Woodland target, also came under a lot of discussion and was the subject of a field survey (Bradshaw, 2011) that assisted to clarify research and further survey requirements for this important target.

The strategy setting exercise is currently underway, with initial results of this work outlined on the pages that follow:

Target: **Black gloved wallaby**

Draft Objective: **To improve the habitat and conservation status of black gloved wallabies (and fauna with similar habitat requirements/threats) in the Forest to Stirlings Functional Landscape by 2015.**

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Undertake community survey of black gloved wallaby and other fauna species (in particular bandicoots) Action steps: 1. Snap shot community survey using mail outs/ email survey forms (by Sep 2011) 2. Undertake targeted survey with kangaroo shooters (by Oct 2011) 3. Undertake targeted community survey - spotlighting, remote cameras, targeting specific areas such as reserves (co-ordinated survey) (by October 2012)	HIGH	Gillamii wk with community/contractors	Phased approach to build up knowledge
Undertake habitat protection (fencing) of good quality bush that has the potential to support black gloved wallabies and create important habitat linkages	HIGH	Gillamii Green Skills	Community survey to inform, but can start this financial year (previous wording: <i>Keep reconnecting habitat and expanding large areas. - informed by results of community fauna survey</i>)
Restoration of key areas of habitat with high linkage value on previously cleared land using high quality revegetation/restoration practices	HIGH	Gillamii SCNRM	Community survey to inform (previous wording: <i>Keep reconnecting habitat and expanding large areas. - informed by results of community fauna survey</i>)
Develop an integrated fox and cat (and rabbit) control program for the broader region Action steps: 1. Investigate sponsorship for a bounty on shooting foxes and cats. 2. Undertake annual fox shoot 3. Larger scale approach to make fox control do-able over regional scales (through NRM groups; Dept Ag etc?) 4. Integrated pilot project in key habitat areas as per FitzStirling pilot undertaken by Bush Heritage Australia (2012)	HIGH	Gillamii/SCNRM Dept of Ag +Plantation and Agriculture Reference grps	
Engage with Department of Planning and Infrastructure to ensure that the regional planning strategy recognises the need for habitat linkages and that this is taken into account with new subdivisions/ other changes affecting native vegetation	LOW	Gondwana Link	Ongoing
Investigate the feasibility of contacting wildlife carers re taking wallabies to release into secure habitats (add to gene pool)	LOW	Gillamii/Green Skills	Further down the track including dealing with approvals from DEC etc.

Target: **Black cockatoos**

Draft Objective: **To improve the habitat and conservation status of black cockatoos in the Forest to Stirlings Functional Landscape by 2015.**

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Identify key nesting sites (trees with hollows within critical distance of key feeding sites); Action steps: 1. Identify trees with hollows (or potential) and protect them 2. Fence remnants	HIGH	Gillamii Green Skills Linking to landholders, Birds Australia	Gen with Clare at BA has data from some sites in Cranbrook Nesting in many vegetation associations Yate swamps, Jarrah Marri, Wandoo More survey required (Already happening - Consider how to get BA people, other bird groups involved. NRM group can provide initial ID of where hollows are; get birds to check for signs of use. Use the ID to also focus on where galahs etc may be a problem and focus that strategy more.
Plant food sources in all plantings	HIGH	NRM Groups	Ensure proteaceous rich species in all revegetation Pines adjacent to reveg?. Which species of Pine- to plant - use SCNRM \$\$ for them
Introduce pilot feral bee control program to reduced competition for nesting hollows	HIGH	Green Skills/Gillamii	Sympathetic landholders conjunction with Dept Ag (disease angle) and bee keepers
Reduce competition for nesting hollows & predators from feral birds	MED	Gillamii/Green Skills/	Develop program to control galahs, kookaburras. NB Clare said there is funding available for shooting competitors
Consider installing artificial nesting hollows; repair potential hollows	LOW	NRM groups	
Drive slower, education (signage) especially in Stirling Range National Park	LOW	DEC NRM groups	

Target: Jarrah/marri associated vegetation communities

Draft Objective: To improve the condition and connectivity of Jarrah/marri associated vegetation communities in the Forest to Stirlings Functional Landscape by 2015.

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Identification of where to fence	HIGH	Gillamii/Green Skills	Laterites less threatened as a result of fewer weeds
Fencing of key jarrah/marri remnants	HIGH	Gillamii/Green Skills	Some information in Gillamii – hard copy Green Skills mapping from past survey work – but more farm by farm assessment required Use existing reports to guide where to fence – e.g., macro-corridor report (2006) – e.g. large remnants within 1km of link Public lands – DOW owned reserves – Keith has lever arch folder with reserves information in them
Connecting critical areas of bushland	MED	Gillamii/Green Skills/ SCNRM	Ranked medium – not because it is less important, but need more information first - NB to ensure that understorey is in good condition when looking at connecting for habitat values
Ensure public lands (and private forestry land) are well managed For fire and grazing pressure etc.	MED	DEC Dept of Water Shires	Make sure that they are well managed and resources – Shire (Lake Pooreracup – & other large areas, DEC, DOW – few resources Also includes land use change in forestry industry (Private land leased to forest industry)– some 10 - 15 years from grazing – (north of Muir highway)
Establish location of protectable areas of for dieback control	MED	Gillamii/Green Skills/SCNRM/DEC/+ Plantation and Agriculture Reference grps	First need knowledge of where they are

Target: **Proteaceous rich shrublands/woodlands**

Draft Objective: **To improve the condition and conservation status of Proteaceous rich shrublands/woodlands in the Forest to Stirlings Functional Landscape by 2020.**

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Identify and map the extent of proteaceous rich communities	HIGH	Gillamii/Green Skills	Flora survey together with existing mapping to identify extent of proteaceous rich communities in the
Fence proteaceous rich remnants	HIGH	Gillamii/Green Skills	Need to identify key areas first
Ensure high quality composition, structure & function are included in all reveg project	HIGH	Gillamii/Green Skills/Gondwana Link/SCNRM	species richness, provenance, diversity etc. seed and/or seedlings - best resource use
Include proteaceous revegetation in key areas	HIGH	Gillamii/Green Skills	Duplicate with one above
Increase regional capacity to apply best direct seeding (and other revegetation) practices	HIGH	SCNRM/Gondwana Link Ltd	Establishment practises including :Seedlings , direct seeding: Geoff Woodall etc. equipment upgrade and techniques, water harvesting on non wetting sands, precision seeding, soil wetter & fertilizer & brush mulching
Implement rabbit control program	HIGH	Dept of Ag NRM groups/+Plantation and Agriculture Reference grps	Ongoing management by landholder bait station, blasting/ ripping of warrens
Increase proportion of proteaceous plants in Carbon Offset programs	HIGH	Gillamii/Green Skills	Carbon farming initiative circulated and discussions happening – ecological co benefits being prioritised - More in other targets
Build knowledge base of fire history, any requirements for small cool fires	MED	Gillamii/Green Skills	DEC starting to look at this. Need to get information about DOW & council reserve areas in Upper Kent
Implement entrance signage for landholders – biosecurity -	MED	Dept of Ag Gillamii	
Inform landholders on fire best management practices for remnants	MED	Gillamii/Green Skills/DEC	See LW guidelines - no fires in small remnants
Phosphite applications in key areas if practicable	MED	Gillamii/SCNRM	
Targeted education on Proteaceae and dieback risk	MED	Gillamii/Green Skills/SCNRM	
Find out if feral pig program successful in Forest to Stirlings area	LOW	Gillamii/Green Skills	More information required
Investigate low cost local testing services for phytophthora	LOW	Gillamii/Green Skills/DEC and Dept of Agriculture	
Maintain ground cover to prevent wind erosion (adjacent areas)	LOW	NRM groups	

Target: **Stirling Range Outliers**

Draft Objective: **To improve the management and condition (from “Good” to “Very Good”) of the Stirling Range outliers in the Forest to Stirlings Functional Landscape by 2020.**

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Fencing of Stirling Range outlier remnant vegetation	HIGH	Gillamii/Green Skills	Some information in Gillamii – hard copy Green Skills mapping from past survey work – but more farm by farm assessment required Use existing reports to guide where to fence – e.g., macro-corridor report (2006) – e.g. large remnants within 1km of link
Ensure public lands are well managed For fire and grazing pressure etc.	MED	DEC Shires Dept of Water	Make sure that they are well managed and resources – Shire (Sukey Hill) – & other large areas, DEC, DOW – few resources
Establish location of protectable areas of for dieback control	MED	Gillamii/Green Skills+Plantation and Agriculture Reference grps	First need knowledge of where they are
Identification of where to fence	LOW	Gillamii/Green Skills	
Connecting critical areas of bushland	LOW	Gillamii/Green Skills/SCNRM	Ranked low (comes later)– but need more information first –these areas are islands – and maybe important for smaller mammals Important to ensure that understorey is in good condition

Target: **Upper Kent Wetland Suite**

Draft Objective: **To improve the management and condition of biodiversity in the Upper Kent Wetland Suite in the Forest to Stirlings Functional Landscape by 2020.**

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Undertake hydrological assessments on key pilot priority sites to determine condition and future prospects	HIGH	Green Skills/consultant	Ruhi Ferdowsian – Key landholders with large areas – with wetlands and large areas of bush
Implement new/known perennial pastures/ agroforestry/ other high water use options for agriculture	HIGH	NRM grps/+Plantation and Agriculture Reference grp	ongoing
Develop decision making framework for optimising location of restoration works	HIGH	Gillamii/Green Skills/Gondwana Ltd	Assessment to allow prioritisation includes fencing, reveg, baiting for ferals etc.
Fencing priority remnants	HIGH	Gillamii/Green Skills	Hand in hand with decision making framework and kangaroo control program
Ensure that there are ongoing culling programs for Kangaroos	HIGH	Gillamii/Dept of Agriculture	Big problem in plantation areas. Bush being hammered in certain areas (difficult in DEC areas)
Revegetation of key areas for biodiversity including buffering & connecting remnants	HIGH	Gillamii/Green Skills/SCNRM	
Build knowledge base of fire history, any requirements for small cool fires	MED	Gillamii/Green Skills/SCNRM/	Need to get information about DOW & council reserve areas in Upper Kent
Inform landholders and land managers on fire best management practices for remnants	MED	Gillamii/Green Skills/SCNRM	See LW guidelines - no fires in small remnants University of Queensland keen to do work on looking at fire management under different scenarios including climate change
Lobby for monitoring to keep a handle on water quality trends	MED	Gillamii/Green Skills/SCNRM with Dept of Water	Part of monitoring (doesn't impact target directly)
Shore bird studies (Peter Taylor) can be used as possible indicator species for monitoring	MED	Gillamii/Green Skills/SCNRM	Part of Monitoring Peter Taylors report will be suggesting ongoing monitoring of key wetlands such as Kwornicup for biodiversity conservation
Investigate extent of water abstraction issues - DOW - abstraction	LOW	Dept of Water	
Investigate status of previous wetland plans (e.g. Lake Matilda, Nunijup, Wamballup)	LOW	Dept of Water	

Target: Wandoo associated vegetation communities

Draft Objective: To improve the condition and connectivity of Wandoo associated vegetation communities in the Forest to Stirlings Functional Landscape by 2015.

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Identification of where to fence	HIGH	Gillamii/Green Skills	Wandoo often goes right down to water tables & associated with hillside seeps and are more prone to water inundation and salinity
Fencing of key Wandoo remnants	HIGH	Gillamii/Green Skills	Some information in Gillamii – hard copy Green Skills mapping from past survey work – but more farm by farm assessment required Use existing reports to guide where to fence – e.g., macro-corridor report (2006) – e.g. large remnants within 1km of link Public lands – DOW owned reserves – Keith Bradby has lever arch folder with reserves information in them
Connecting critical areas of bushland	MED	Gillamii/Green Skills/SCNRM	Ranked medium – not because it is less important, but need more information first - NB to ensure that understorey is in good condition when looking at connecting for habitat values
Ensure public lands (and private forestry land) are well managed For fire and grazing pressure etc.	MED	DEC Shires Dept of Water	Make sure that they are well managed and resources – Shire (Lake Pooreracup – & other large areas, DEC, DOW – few resources Also includes landuse change in forestry industry (Private land leased to forest industry)– some 10 - 15 years from grazing – (north of Muir highway)
Establish location of protectable areas of for dieback control	MED	Gillamii/Green Skills/SCNRM	First need knowledge of where they are
Link to groups monitoring wandoo decline – CRC etc	MED	Gillamii/Green Skills	Link between Murdoch and forestry tree decline group – links – Entomologist Francesco based in Albany (Geoff Rolland comment)

Target: **West Balicup Wetland Suite**

Draft Objective: **To improve the condition of the West Balicup Wetland Suite in the Forest to Stirlings Functional Landscape by 2020.**

Strategic actions/ action steps	Priority	Who (Coordinating)	Details/ comments
Implement new/known perennial pastures/ agroforestry/ other high water use options for agriculture	HIGH	NRM Grps+Plantation and Agriculture Reference grps	ongoing
Develop decision making framework for optimising location of restoration works	HIGH	Gillamii/Green Skills	Assessment to allow prioritisation includes fencing, reveg, baiting for ferals etc.
Fencing priority remnants	HIGH	Gillamii/Green Skills	Hand in hand with decision making framework and kangaroo control program
Ensure that there are ongoing culling programs for Kangaroos	HIGH	Gillamii with Dept of Agriculture	Need to establish extent of issue in this area
Revegetation of key areas for biodiversity including buffering & connecting remnants	HIGH	Gillamii/Green Skills/SCNRM	
Build knowledge base of fire history, any requirements for small cool fires	MED	Gillamii/Green Skills/SCNRM	Need to get information about DOW & council reserve areas in Balicup
Inform landholders and land managers on fire best management practices for remnants	MED	Gillamii/Green Skills/SCNRM	See LfW guidelines - no fires in small remnants University of Queensland keen to do work on looking at fire management under different scenarios including climate change
Lobby for monitoring to keep a handle on water quality trends	MED	Department of Water	Part of monitoring (doesn't impact target directly)
Shore bird studies (Peter Taylor) can be used as possible indicator species for monitoring	MED	Gillamii/Green Skills/SCNRM	Part of Monitoring Peter Taylors report will be suggesting ongoing monitoring of key wetlands for biodiversity conservation

References:

Bradshaw, W. 2011. Survey for Proteaceous Rich Shrublands/Woodlands Target for Gondwana Stirling to Forest Link. Unpublished Internal South Coast NRM Report, Albany, 4 March, 2011

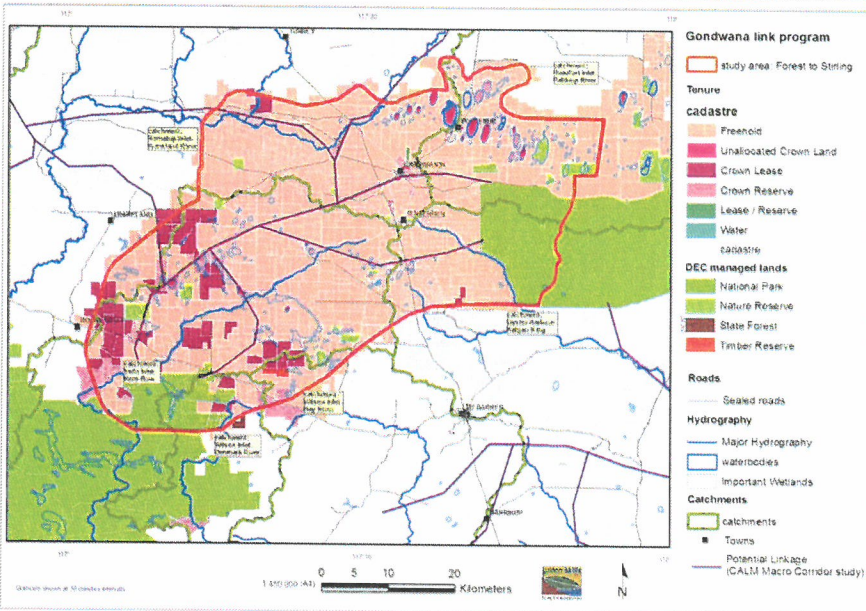
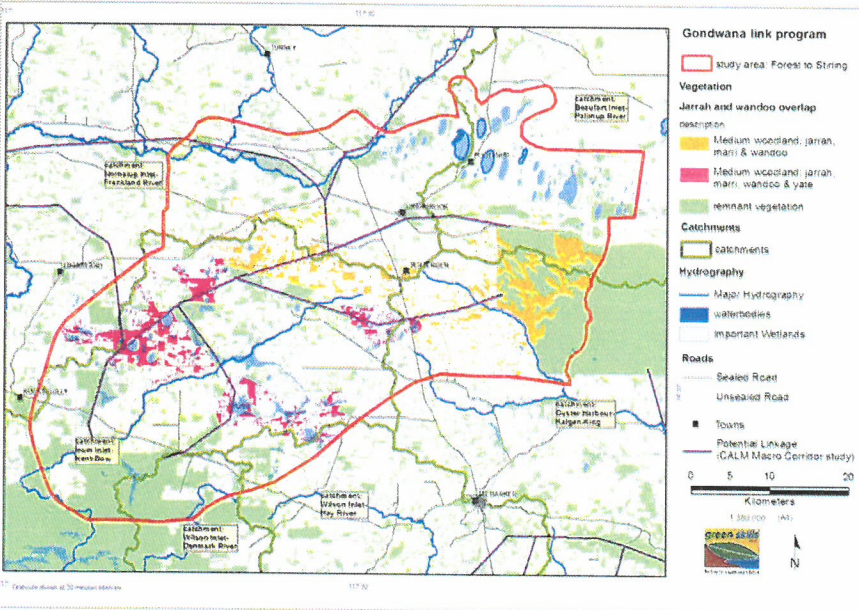
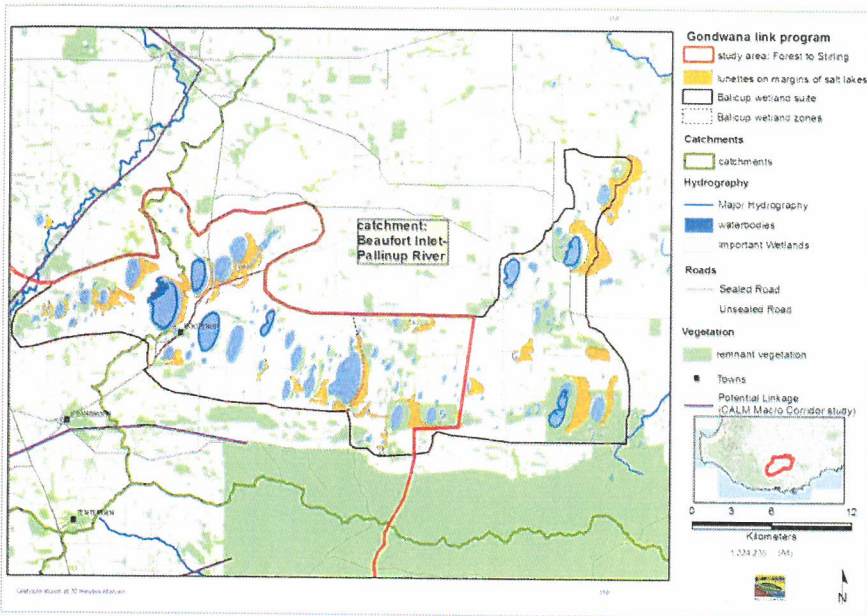
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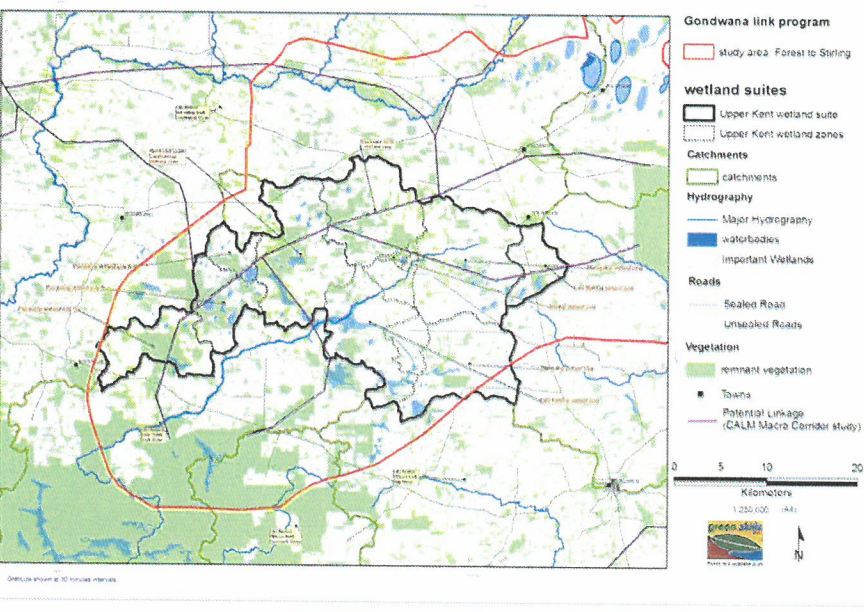
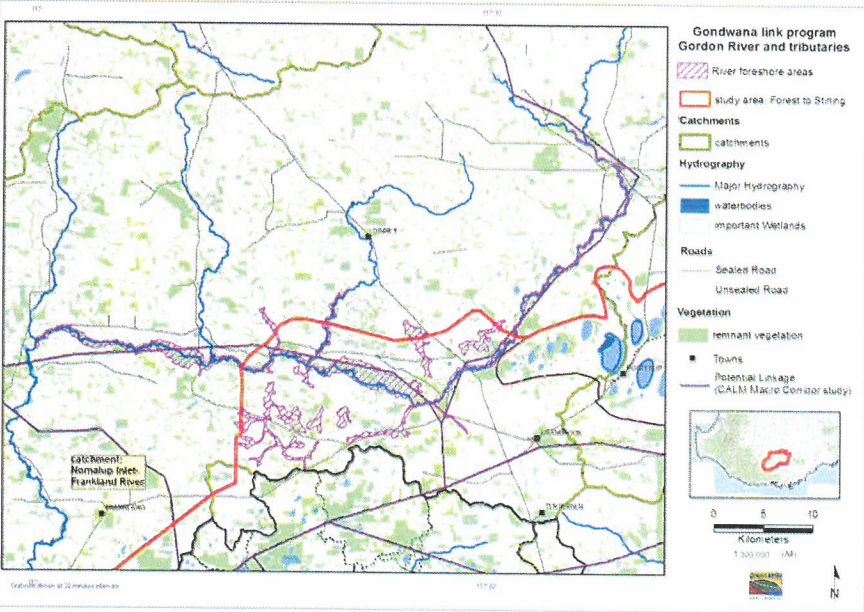
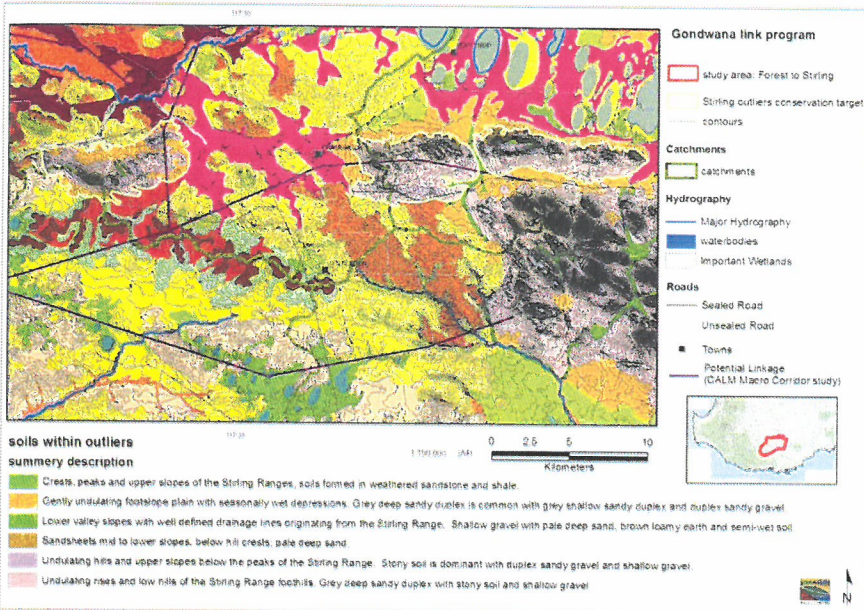
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Wilkins, P., Gilfillan, S., Watson, J. and Sanders, A. (ed). 2006. *The Western Australian South Coast Macro Corridor Network – a bioregional strategy for nature conservation*, Department of Conservation and Land Management (CALM) and South Coast Regional Initiative Planning Team (SCRIPT), Albany.

Appendix 1. Additional maps produced during the CAP planning as well as statistics relating to key targets for the Forest to Stirlings.





Statistics for Water Bodies

	area in ha	area waterbodies in ha
Study area	266,634	12,422
West Balicup wetland suite	32,225	5,208
Central - West Zone	11,450	2,235
Western Zone	12,828	2,403
Central - East Zone	7,947	570
Upper Kent wetland suite	69,509	4,165
Martagallup wetland zone	13011	265
Nunijup wetland zone	335	67
Stockyard north wetland zone	9467	89
Stockyard south Carabundup wetland zone	11623	976
Poorarecup wetland zone A	2266	272
Poorarecup wetland zone B	5085	518
Poorarecup wetland zone C	6413	230
Lake Kathrine wetland zone	8692	1,098
Wambellup wetland zone	9249	447
Lake Matilda wetland zone	3368	203

Statistics for Tenure

tenure	area in ha
Crown Lease	18,588
Crown Reserve	44,585
National Park	31503.1
Nature Reserve	5094.4
Freehold	196,357
Lease / Reserve	135
Public Roads	91
State Forest / Timber Reserve	464
Unallocated Crown Land	3,136
Water	62
Study area	266,634

Statistics for Vegetation Associations:

description of vegetation association	hectares within study area
Vegetation associations including wandoo	
Medium woodland; jarrah, marri & wandoo	14,540
Medium woodland; jarrah, marri, wandoo & yate	9,267
Medium woodland; wandoo & yate	8,364
Medium woodland; wandoo, yate & river gum	7,217
Medium woodland; wandoo, York gum & yate	179
Grand Total wandoo occurrences	39,566
Vegetation associations including jarrah	
Low woodland; jarrah	432
Medium forest; jarrah-marri	26,983
Medium woodland; jarrah & river gum	246
Medium woodland; jarrah, marri & wandoo	14,540
Medium woodland; jarrah, marri, wandoo & yate	9,267
Shrublands; jarrah mallee-heath	7,343
Grand Total	58,811
overlap of wandoo and jarrah associations	
Medium woodland; jarrah, marri & wandoo	14,540
Medium woodland; jarrah, marri, wandoo & yate	9,267
Grand Total	23,807
area covered by wandoo and jarrah associations within the study area	74,570

Statistics for Stirling Range Outliers:

	area of outliers	area (ha) of remnant vegetation within outliers	% rem veg of total area
outlier west	2,840	911	32
outlier mid	2,911	818	28
outlier east	2,409	1,032	43
total	8,160	2,761	34

	area in hectares			
	outlier west	outlier mid	outlier east	total
crown reserve	3.8 (Nature Reserve)	230.8	465.3 (National Park)	230.8
freehold	2805.0	2633.6	1930.8	7369.4
public roads		2.2		2.2
unallocated crown land	0.5			0.5