



Gondwana Link - Forest to Stirlings (ID: 1721)

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Basic

Project Information

Contact Name: Keith Bradby

Contact Organization: Gondwana Link

Project Start Date: September 15, 2010

Data Effective Date: September 15, 2010

Hectares:200,000

Sharing Status:

Ecoregion(s):

- Jarrah-Karri Forest And Shrublands
- Southwest Australia Woodlands

Operational Unit(s):

- Australia

Country(ies):

- Australia

Associated Initiative(s): None

Action Plan:

- To improve the condition and connectivity of Jarrah/marri associated vegetation communities in the Forest to Stirlings Functional
- To improve the condition and connectivity of Wandoo associated vegetation communities in the Forest to Stirlings Functional Landscape by 2015
- To improve the condition and conservation status of Proteaceous rich shrublands/woodlands in the Forest to Stirlings Functional Landscape by 2020.
- To improve the condition of the West Balicup Wetland Suite in the Forest to Stirlings Functional Landscape by 2020.
- To improve the habitat and conservation status of black cockatoos in the Forest to Stirlings Functional Landscape by 2015.
- 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.
- 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.
- To improve the management and condition of biodiversity in the Upper Kent Wetland Suite in the Forest to Stirlings Functional Landscape by 2020.

Targets

Focal Conservation Target	Target Type	Habitat Type
Upper Kent Wetland Suite ^{Target - 1}	Single Species: Bird	
Wandoo associated vegetation communities ^{Target - 2}		
Proteaceous rich shrublands/woodlands ^{Target - 3}	Ecological System	
Black gloved wallaby ^{Target - 4}	Ecological System	
Jarrah/Marri associated vegetation communities ^{Target - 5}		
Carnaby's black cockatoo	Single Species: Bird	
Stirling Range outliers ^{Target - 7}		
West Balicup Wetland Suite ^{Target - 8}	Ecological System	

Notes:

Target - 1 Description: A number of significant wetlands have been mapped within the Forest to Stirling area by the Department of Water. These include a number of significant wetlands in the Upper Kent Catchment, many of which have been identified as being threatened or at risk and locally outstanding (Hopkinson, 2003). The Upper Kent Catchment area contains a large group of wetlands that share a range of similar characteristics and attributes. These wetlands were identified as being regionally significant in the regional evaluation of wetlands of the South Coast region. The evaluation classified the group as the Unicum suite of wetlands (Semenuik 1999). The Unicum suite contains a range of wetlands that occur in both shire reserve and on privately owned property. The shire reserves include the major lakes Nunijup, Poorarecup and Carabundup. The wetlands in these reserves have been identified as being important habitat for a large number of waterbirds, particularly those listed on international treaties. This includes the Banded Stilt, and endemic Australian shorebird of international significance. (Semenuik 1999).

Target - 1 Description Comment: Some work has been on the condition of fringing vegetation (measured by fringing vegetation rated from Poor to Excellent) & salinity of Wetlands in the Upper Kent Catchment and each wetland surveyed has been given a conservation and management priority (Low, Medium and High) (Hopkinson, 2003).

Target - 2 Description: Wandoo woodlands dominant ground layer of Restionaceae, Liliaceae, Orchidaceae, Poaceae, Asteraceae, with scattered shrub understorey of hakeas and acacias and gastrolobiums. Occurs on duplex soils, gravel over clay, clay/loams. Mistletoe (*Amyema* sp.) is known to be an important element of this system.

Target - 2 Description Comment: Until better mapping - Beards mapping is being used and for this target it is all vegetation units containing wandoo. Comments from Ranges Link: This ecosystem is seen as the highest priority by the Ranges Link group Critical factors to keep wandoo in the landscape - i.e. what does a healthy patch have: Density of trees - some areas are more open though - need to have recruiting trees Full crown Open intact understorey Low-deep water table - not included in viability table ponding and flowthrough No stock - compaction an issue - affects porosity of soils Wildlife activity Hollows - habitat value for tree dwellers Comments from Ranges Link Work There are a number of other fauna species that inhabit wandoo woodland including owls, ducks nesting in large trees. Threats to smaller woodland birds include large aggressive birds such as kookaburra & currawongs, however currawongs can be useful for spreading larger fleshy fruited seed into revegetation - e.g. *Exocarpus sparteus* (native cherry) found coming up naturally in revegetation areas (Peter Luscombe).

Target - 3 Description: These proteaceous rich communities occur on deep sands and transition mallee (laterite ridges) (Wendy to supply info from fire map on this latter community on laterite to assist with the mapping of the target)

Target - 3 Description Comment: Note - Wendy - other areas within area on deep sands not only on the Balicup Wetlands. Reason for selecting these out - separate soil type - deep sands. These communities occur on sand and gravels and the *Banksia attenuata* occur on lunettes. Occur on lunettes next to wetlands as well as on soils associated with rivers - e.g. Gordon River. Still need to get some more information on this - Wendy to look for more revegetation Bill - occurs on floodplain on yellow sands on immediately west of bridge on Gordon River on the Boyup Brook - Cranbrook road, possibly *Banksia prinoidea* there (Bill) Wendy (3 November 2010) - also near Cranbrook Notes from Wendy - *Banksia attenuata* with *Banksia coccinea*. Her observation is that *B. attenuata* occurs on the lunettes associated with lakes and rivers. She hasn't had the opportunity to dig up a photo of a massive *Banksia attenuata* on dunes near Tambellup. According to florabase, it grows across the project area on a range of deep sandy soils, sometimes over laterite. She dug up her notes from that site visit she did in 2001 to a Lake Poorarecup Reserve 22451, and the *Banksia* associated with WA Christmas tree and *E. rudis* and jarrah was *B. littoralis*.

Target - 4 Description: Black-gloved wallaby (*Macropus irma*) (information from DEC pamphlet) Description Pale to mid grey with distinct white facial stripe, black and white ears, black hands and feet. Long tail with crest of black hair towards extremity. Moves fast with head low and tail extended. Distribution The western brush wallaby was very common in the early days of settlement and periodically large numbers were traded commercially for skins. Their range has been seriously reduced and fragmented due to clearing for agriculture and there is a significant decline in abundance within most remaining habitat. The western brush wallaby is now distributed across the south-west of Western Australia from north of Kalbarri to Cape Arid. Habitat The western brush wallaby's optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest. Behaviour The western brush wallaby is a grazer like the larger kangaroos, rather than a browser. It has not been studied in detail. Activity is greatest in the early morning and late afternoon and it rests during the hotter part of day, singly or in pairs in the shade of a bush or in small thickets. It is more diurnal in its habits than other macropods in the region. Threatening processes A dramatic increase in the number of foxes in the early 1970s in south-western Australia appears to have led to a decline in the numbers of western brush wallaby. It is thought that juveniles not long out of the pouch may fall prey to this predator. The western brush wallaby is now uncommon throughout its range but its numbers increase in response to fox baiting. It is thought that foxes may take young wallabies and there is also evidence that illegal hunting may affect their abundance in some areas. Conservation status 2000 IUCN Red List of Threatened Species Lower Risk (near threatened) Western Australian Wildlife Conservation Act Not Listed (Priority 4) Environment Protection and Biodiversity Conservation Act Not listed Habitat fragmentation and size requirement statement from Sandra Gilfillan (in litt., 2010) The decline of Black-gloved Wallabies in the wheatbelt may be attributed to fragmentation and isolation of remnants. Courtney (1994) reported that, in DEC's Katanning District, only 20% of reserves less than 100ha, and only 50% less than 500 ha, which had Black-gloved Wallabies in the 1980's still had them in the 1990's. She reported observations suggesting that the species can survive on reserves less than 500 ha providing there is sufficient structural diversity to provide both dense vegetation for shelter and more open areas for feeding. Short and Parsons (2004) demonstrated a significant relationship between the presence of Black-gloved Wallabies and reserve area in the wheatbelt, the species requiring approximately 83 ha of remnant to have a 10% probability of occurrence and approximately 500ha for a 40% probability. The smallest remnant that the Black-gloved Wallaby was found to occur in was 119 ha. Courtney, J. (1994). Status and Conservation of the Western Black-gloved Wallaby (*Macropus irma*). Conservation Statement prepared for the Conservation Council of Western Australia. Short, J. and Parsons, B. (2004). A Test of the Focal Species Approach in Western Australia. Final Report for the Land and Water Australia Project CSE9. Testing approaches to Landscape Design in Cropping Lands. CSIRO, Sustainable Ecosystems, Perth.

Target - 5 Description: Until better mapping - Beards mapping is being used and for this target it is all vegetation units containing jarrah

Target - 7 Description: Ridge and hill vegetation extending westwards from the Stirlings to Geekabee hill, primarily occurring on Stirling Range sandstone and quartzite

Target - 7 Description Comment: High diversity, distinctive areas, more similarities for Stirling veg = rather than Iron stones to the north and south Distinctive landform - probably more than one vegetation type - probably fire requirements is important, biodiverse and distinctive, look at elevation of this, includes Sukey hill near Cranbrook. Occur on sandstones - sedimentary - check on this - Geekabee hill. Shaley soils Wendy to look up *Lambertia* Nature Map search of Geekabee hill area has turned up 158 plant species including one endemic to this hill (*Cyanicula x Elythranthera sericea x brunonis*) and a number of priority listed species

Target - 8 Description: As per Hopkinson (2005), the area for the Forest to Stirling CAP includes the Western, Central-West & Central East Zones which were historically saline. The North Stirlings area contains a large group of wetlands that share a range of similar characteristics and attributes. Some of these wetlands are contained within substantial nature reserves and have been recognised as being nationally significant, being listed as the Balicup Lake System in the National Directory of Important Wetlands in Australia (ANCA 1996). In addition, these wetlands were identified as being regionally significant in the regional evaluation of wetlands of the South Coast Region. This evaluation classified the group as the Balicup suite of wetlands, following the listing in the ANCA Directory (Semenuik, 1999). The Balicup suite contains a range of wetlands that occur in both nature reserves and on privately owned property. The nature reserves included the major lakes Balicup, Camel, and Jebarjup. The wetlands of these reserves have been identified as being important habitat for a large number of waterbirds, particularly those listed on international treaties. This includes the Banded Stilt, an endemic Australian shorebird of international significance (Semenuik, 1999).

Target - 8 Description Comment: Information from Hopkinson (2005): the largely impermeable sediments of the basin floor have a low hydraulic conductivity resulting in little groundwater movement in the area. As a result salts have concentrated and the regional aquifer is extremely saline. Many of the wetlands of the basin are groundwater discharge sites and are therefore naturally saline.

Threats

Threat (<i>Common Taxonomy</i>)	Targets Threatened
Climate change (Undefined :: Undefined)	<ul style="list-style-type: none"> • 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
Fragmentation due to historical clearing (Undefined :: Undefined)	<ul style="list-style-type: none"> • Black gloved wallaby • Carnaby's black cockatoo • Jarrah/Marri associated vegetation communities • Proteaceous rich shrublands/woodlands • Stirling Range outliers • Upper Kent Wetland Suite • Wandoo associated vegetation communities
Wildfire (Undefined :: Undefined)	<ul style="list-style-type: none"> • 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
Loss of food sources within foraging distance of nesting sites (Undefined :: Undefined)	<ul style="list-style-type: none"> • Carnaby's black cockatoo
Phytophthora (Undefined :: Undefined)	<ul style="list-style-type: none"> • Wandoo associated vegetation communities • Proteaceous rich shrublands/woodlands • Jarrah/Marri associated vegetation communities • Stirling Range outliers
Current Clearing (development, infrastructure, farming) (Undefined :: Undefined)	<ul style="list-style-type: none"> • Upper Kent Wetland Suite • Wandoo associated vegetation communities • Black gloved wallaby • Jarrah/Marri associated vegetation communities
Clearing induced hydrological change (Undefined :: Undefined)	<ul style="list-style-type: none"> • Upper Kent Wetland Suite • Wandoo associated vegetation communities • West Balicup Wetland Suite
Current Removal of Paddock Trees (Undefined :: Undefined)	<ul style="list-style-type: none"> • Wandoo associated vegetation communities • Carnaby's black cockatoo
Grazing (rabbits, roos, livestock & feral pigs) (Undefined :: Undefined)	<ul style="list-style-type: none"> • 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
Competition for hollows (Undefined :: Undefined)	<ul style="list-style-type: none"> • Wandoo associated vegetation communities • Carnaby's black cockatoo
Marri canker (Undefined :: Undefined)	<ul style="list-style-type: none"> • Jarrah/Marri associated vegetation communities
Weeds (Undefined :: Undefined)	<ul style="list-style-type: none"> • Black gloved wallaby • Carnaby's black cockatoo • Jarrah/Marri associated vegetation communities • Proteaceous rich shrublands/woodlands • Stirling Range outliers • Upper Kent Wetland Suite • Wandoo associated vegetation communities • West Balicup Wetland Suite

Threat (Common Taxonomy)	Targets Threatened
Carnivores (foxes, cats, pigs, kookaburras) (Undefined :: Undefined)	<ul style="list-style-type: none"> Wandoo associated vegetation communities Black gloved wallaby Carnaby's black cockatoo
Deaths by vehicles (Undefined :: Undefined)	<ul style="list-style-type: none"> Black gloved wallaby Carnaby's black cockatoo
Prescribed burning (current practices) (Undefined :: Undefined)	<ul style="list-style-type: none"> Wandoo associated vegetation communities Jarrah/Marri associated vegetation communities
Barriers (fences, roads) (Undefined :: Undefined)	<ul style="list-style-type: none"> Black gloved wallaby
Farming practices (Undefined :: Undefined)	<ul style="list-style-type: none"> Proteaceous rich shrublands/woodlands
Loss of mycovores (Woylies & quenda) (Undefined :: Undefined)	<ul style="list-style-type: none"> Wandoo associated vegetation communities
Shooting by orchadists and farmers (Undefined :: Undefined)	<ul style="list-style-type: none"> Carnaby's black cockatoo
Water abstraction (Undefined :: Undefined)	<ul style="list-style-type: none"> Upper Kent Wetland Suite
High water use by plantation forests (Undefined :: Undefined)	<ul style="list-style-type: none"> Upper Kent Wetland Suite Jarrah/Marri associated vegetation communities Stirling Range outliers

Strategies

Strategy (Common Taxonomy)	Threats Addressed
HIGH priority - Develop an integrated fox and cat (and rabbit) control program for the broader region <i>Undefined :: Undefined</i>	-
HIGH priority - Develop decision making framework for optimising location of restoration works <i>Undefined :: Undefined</i>	-
HIGH priority - Ensure high quality composition, structure & function are included in all reveg project <i>Undefined :: Undefined</i>	-
HIGH priority - Ensure that there are ongoing culling programs for Kangaroos <i>Undefined :: Undefined</i>	-
HIGH priority - Fence proteaceous rich remnants <i>Undefined :: Undefined</i>	-
HIGH priority - Fencing of key jarrah/marri remnants <i>Undefined :: Undefined</i>	-
HIGH priority - Fencing of key Wandoo remnants <i>Undefined :: Undefined</i>	-
HIGH priority - Fencing of Stirling Range outlier remnant vegetation <i>Undefined :: Undefined</i>	-
HIGH priority - Fencing priority remnants <i>Undefined :: Undefined</i>	-
HIGH priority - Identification of where to fence <i>Undefined :: Undefined</i>	-
HIGH priority - Identify and map the extent of proteaceous rich communities <i>Undefined :: Undefined</i>	-
HIGH priority - Identify key nesting sites (trees with hollows within critical distance of key feeding sites); <i>Undefined :: Undefined</i>	-
HIGH priority - Implement new/known perennial pastures/ agroforestry/ other high water use options for agriculture <i>Undefined :: Undefined</i>	-

Strategy (<i>Common Taxonomy</i>)	Threats Addressed
HIGH priority - Implement rabbit control program <i>Undefined :: Undefined</i>	-
HIGH priority - Include proteaceous revegetation in key areas <i>Undefined :: Undefined</i>	-
HIGH priority - Increase proportion of proteaceous plants in Carbon Offset programs <i>Undefined :: Undefined</i>	-
HIGH priority - Increase regional capacity to apply best direct seeding (and other revegetation) practices <i>Undefined :: Undefined</i>	-
HIGH priority - Introduce pilot feral bee control program to reduced competition for nesting hollows <i>Undefined :: Undefined</i>	-
HIGH priority - Plant food sources in all plantings <i>Undefined :: Undefined</i>	-
HIGH priority - Restoration of key areas of habitat with high linkage value on previously cleared land using high quality revegetation/restoration practices <i>Undefined :: Undefined</i>	-
HIGH priority - Revegetation of key areas for biodiversity including buffering & connecting remnants <i>Undefined :: Undefined</i>	-
HIGH Priority - Undertake community survey of black gloved wallaby and other fauna species (in particular bandicoots) <i>Undefined :: Undefined</i>	-
HIGH priority - Undertake habitat protection (fencing) of good quality bush that has the potential to support black gloved wallabies and create important habitat linkages <i>Undefined :: Undefined</i>	-
HIGH priority - Undertake hydrological assessments on key pilot priority sites to determine condition and future prospects <i>Undefined :: Undefined</i>	-
LOW priority - Connecting critical areas of bushland <i>Undefined :: Undefined</i>	-
LOW priority - Consider installing artificial nesting hollows; repair potential hollows <i>Undefined :: Undefined</i>	-
LOW priority - Drive slower, education (signage) especially in Stirling Range National Park <i>Undefined :: Undefined</i>	-
LOW priority - Engage with Dept 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 <i>Undefined :: Undefined</i>	-
LOW priority - Find out if feral pig program successful in Forest to Stirlings area <i>Undefined :: Undefined</i>	-
LOW priority - Identification of where to fence. <i>Undefined :: Undefined</i>	-
LOW priority - Investigate extent of water abstraction issues - DOW - abstraction <i>Undefined :: Undefined</i>	-
LOW priority - Investigate low cost local testing services for phytosphora <i>Undefined :: Undefined</i>	-

Strategy (Common Taxonomy)	Threats Addressed
LOW priority - Investigate status of previous wetland plans (e.g. Lake Matilda, Nunijup, Wamballup) <i>Undefined :: Undefined</i>	-
LOW priority - Investigate the feasibility of contacting wildlife carers re taking wallabies to release into secure habitats (add to gene pool) <i>Undefined :: Undefined</i>	-
LOW priority - Maintain ground cover to prevent wind erosion (adjacent areas) <i>Undefined :: Undefined</i>	-
MED priority - Build knowledge base of fire history, any requirements for small cool fires <i>Undefined :: Undefined</i>	-
MED priority - Connecting critical areas of bushland <i>Undefined :: Undefined</i>	-
MED priority - Ensure public lands (and private forestry land) are well managed for fire and grazing pressure etc. <i>Undefined :: Undefined</i>	-
MED priority - Ensure public lands are well managed for fire and grazing pressure etc. <i>Undefined :: Undefined</i>	-
MED priority - Establish location of protectable areas of for dieback control <i>Undefined :: Undefined</i>	-
MED priority - Implement entrance signage for landholders - biosecurity - <i>Undefined :: Undefined</i>	-
MED priority - Inform landholders and land managers on fire best management practices for remnants <i>Undefined :: Undefined</i>	-
MED priority - Inform landholders on fire best management practices for remnants <i>Undefined :: Undefined</i>	-
MED priority - Link to groups monitoring wandoo decline - CRC etc <i>Undefined :: Undefined</i>	-
MED priority - Lobby for monitoring to keep a handle on water quality trends <i>Undefined :: Undefined</i>	-
MED priority - Phosphite applications in key areas if practicable <i>Undefined :: Undefined</i>	-
MED priority - Reduce competition for nesting hollows & predators from feral birds <i>Undefined :: Undefined</i>	-
MED priority - Shore bird studies (Peter Taylor) can be used as possible indicator species for monitoring <i>Undefined :: Undefined</i>	-
MED priority - Targeted education on Proteaceae and dieback risk <i>Undefined :: Undefined</i>	-

Viability Summary

Conservation Targets		Landscape Context		Condition		Size		Viability Rank
		Grade	Weight	Grade	Weight	Grade	Weight	
1	Upper Kent Wetland Suite	Fair	1.0	Fair	1.0	-	1.0	Fair
2	Wandoo associated vegetation communities	Fair	1.0	Fair	1.0	Poor	1.0	Fair
3	Proteaceous rich shrublands/woodlands	Fair	1.0	Fair	1.0	-	1.0	Fair
4	Black gloved wallaby	Fair	1.0	-	1.0	Poor	1.0	Fair
5	Jarrah/Marri associated vegetation communities	Fair	1.0	Fair	1.0	Fair	1.0	Fair
6	Carnaby's black cockatoo	Fair	1.0	Fair	1.0	Poor	1.0	Fair
7	Stirling Range outliers	Good	1.0	Good	1.0	-	1.0	Good
8	West Balicup Wetland Suite	Fair	1.0	Fair	1.0	-	1.0	Fair
Project Biodiversity Health Rank								Fair

Threat Summary

Project-specific Threats (Common Taxonomy *)	Black gloved wallaby	Carnaby's black cockatoo	Jarrah/Marri associated vegetation communities	Proteaceous rich shrublands/woodlands	Stirling Range outliers	Upper Kent Wetland Suite	Wandoo associated vegetation communities	West Balicup Wetland Suite	Overall Threat Rank
Climate change (Undefined)	Medium	Very High	High	High	Medium	High	High	Medium	Very High
Fragmentation due to historical clearing (Undefined)	High	Very High	Medium	High	Medium	High	High	-	Very High
Wildfire (Undefined)	Medium	High	Medium	High	Low	Medium	High	Low	High
Loss of food sources within foraging distance of nesting sites (Undefined)	-	Very High	-	-	-	-	-	-	High
Phytophthora (Undefined)	-	-	High	High	Low	-	Medium	-	High
Current Clearing (development, infrastructure, farming) (Undefined)	High	-	Medium	-	-	Low	Medium	-	Medium
Clearing induced hydrological change (Undefined)	-	-	-	-	-	High	Medium	Medium	Medium
Current Removal of Paddock Trees (Undefined)	-	High	-	-	-	-	Medium	-	Medium
Grazing (rabbits, roos, livestock & feral pigs) (Undefined)	Medium	Low	Medium	Medium	Low	Medium	Medium	Low	Medium
Competition for hollows (Undefined)	-	High	-	-	-	-	Low	-	Medium
Marri canker (Undefined)	-	-	High	-	-	-	-	-	Medium
Weeds (Undefined)	Low	Low	Medium	Medium	Low	Low	Medium	Medium	Medium
Carnivores (foxes, cats, pigs, kookaburras) (Undefined)	Medium	Medium	-	-	-	-	Medium	-	Medium

Project-specific Threats (Common Taxonomy *)	Black gloved wallaby	Carnaby's black cockatoo	Jarrah/Marri associated vegetation communities	Proteaceous rich shrublands/woodlands	Stirling Range outliers	Upper Kent Wetland Suite	Wandoo associated vegetation communities	West Balicup Wetland Suite	Overall Threat Rank
Deaths by vehicles (Undefined)	Medium	Medium	-	-	-	-	-	-	Medium
Prescribed burning (current practices) (Undefined)	-	-	Medium	-	-	-	Low	-	Low
Barriers (fences, roads) (Undefined)	Medium	-	-	-	-	-	-	-	Low
Farming practices (Undefined)	-	-	-	Medium	-	-	-	-	Low
Loss of mycovores (Woylies & quenda) (Undefined)	-	-	-	-	-	-	Medium	-	Low
Shooting by orchadists and farmers (Undefined)	-	Medium	-	-	-	-	-	-	Low
Water abstraction (Undefined)	-	-	-	-	-	Medium	-	-	Low
High water use by plantation forests (Undefined)	-	-	Low	-	Low	Low	-	-	Low
Threat Status for Targets and Project	High	Very High	High	High	Medium	High	High	Medium	Very High

Action Plan

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

- **Strategic Action:** MED priority - Establish location of protectable areas of for dieback control
- **Strategic Action:** MED priority - Ensure public lands (and private forestry land) are well managed for fire and grazing pressure etc.
- **Strategic Action:** MED priority - Connecting critical areas of bushland
- **Strategic Action:** HIGH priority - Fencing of key jarrah/marri remnants
- **Strategic Action:** HIGH priority - Identification of where to fence

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

- **Strategic Action:** MED priority - Link to groups monitoring wandoo decline - CRC etc
- **Strategic Action:** MED priority - Establish location of protectable areas of for dieback control
- **Strategic Action:** MED priority - Ensure public lands are well managed for fire and grazing pressure etc.
- **Strategic Action:** MED priority - Connecting critical areas of bushland
- **Strategic Action:** HIGH priority - Fencing of key Wandoo remnants
- **Strategic Action:** HIGH priority - Identification of where to fence

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

- **Strategic Action:** LOW priority - Maintain ground cover to prevent wind erosion (adjacent areas)
- **Strategic Action:** LOW priority - Investigate low cost local testing services for phytophthora
- **Strategic Action:** LOW priority - Find out if feral pig program successful in Forest to Stirlings area
- **Strategic Action:** MED priority - Targeted education on Proteaceae and dieback risk
- **Strategic Action:** MED priority - Phosphite applications in key areas if practicable
- **Strategic Action:** MED priority - Inform landholders on fire best management practices for remnants
- **Strategic Action:** MED priority - Implement entrance signage for landholders - biosecurity -
- **Strategic Action:** MED priority - Build knowledge base of fire history, any requirements for small cool fires
- **Strategic Action:** HIGH priority - Increase proportion of proteaceous plants in Carbon Offset programs
- **Strategic Action:** HIGH priority - Implement rabbit control program
- **Strategic Action:** HIGH priority - Increase regional capacity to apply best direct seeding (and other revegetation) practices
- **Strategic Action:** HIGH priority - Include proteaceous revegetation in key areas

- **Strategic Action:** HIGH priority - Ensure high quality composition, structure & function are included in all reveg project
- **Strategic Action:** HIGH priority - Fence proteaceous rich remnants
- **Strategic Action:** HIGH priority - Identify and map the extent of proteaceous rich communities

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

- **Strategic Action:** MED priority - Shore bird studies (Peter Taylor) can be used as possible indicator species for monitoring
- **Strategic Action:** MED priority - Lobby for monitoring to keep a handle on water quality trends
- **Strategic Action:** MED priority - Inform landholders and land managers on fire best management practices for remnants
- **Strategic Action:** MED priority - Build knowledge base of fire history, any requirements for small cool fires
- **Strategic Action:** HIGH priority - Revegetation of key areas for biodiversity including buffering & connecting remnants
- **Strategic Action:** HIGH priority - Ensure that there are ongoing culling programs for Kangaroos
- **Strategic Action:** HIGH priority - Fencing priority remnants
- **Strategic Action:** HIGH priority - Develop decision making framework for optimising location of restoration works
- **Strategic Action:** HIGH priority - Implement new/known perennial pastures/ agroforestry/ other high water use options for agriculture

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

- **Strategic Action:** HIGH priority - Plant food sources in all plantings

Strategic Action: HIGH priority - Identify key nesting sites (trees with hollows within critical distance of key feeding sites);

- **Action Step:** Fence remnants
- **Action Step:** Identify trees with hollows (or potential) and protect them
- **Strategic Action:** LOW priority - Drive slower, education (signage) especially in Stirling Range National Park
- **Strategic Action:** LOW priority - Consider installing artificial nesting hollows; repair potential hollows
- **Strategic Action:** MED priority - Reduce competition for nesting hollows & predators from feral birds
- **Strategic Action:** HIGH priority - Introduce pilot feral bee control program to reduced competition for nesting hollows

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 Action: HIGH priority - Develop an integrated fox and cat (and rabbit) control program for the broader region

- **Action Step:** Integrated pilot project in key habitat areas as per FitzStirling pilot undertaken by Bush Heritage Australia (2012)

- **Action Step:** Investigate sponsorship for a bounty on shooting foxes and cats.
- **Action Step:** Larger scale approach to make fox control do-able over regional scales (through NRM groups; Dept Ag etc?)
- **Action Step:** Undertake annual fox shoot

Strategic Action: HIGH Priority - Undertake community survey of black gloved wallaby and other fauna species (in particular bandicoots)

- **Action Step:** Undertake targeted survey with kangaroo shooters (by Oct 2011)
- **Action Step:** Snap shot community survey using mailouts/ email survey forms (by Sep 2011)
- **Action Step:** Undertake targeted community survey - spotlighting, remote cameras, targeting specific areas such as reserves (co-ordinated survey) (by October 2012)

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 Action:** MED priority - Establish location of protectable areas of for dieback control
- **Strategic Action:** LOW priority - Connecting critical areas of bushland
- **Strategic Action:** LOW priority - Identification of where to fence.
- **Strategic Action:** MED priority - Ensure public lands are well managed for fire and grazing pressure etc.
- **Strategic Action:** HIGH priority - Fencing of Stirling Range outlier remnant vegetation

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 Action:** LOW priority - Investigate status of previous wetland plans (e.g. Lake Matilda, Nunijup, Wamballup)
- **Strategic Action:** LOW priority - Investigate extent of water abstraction issues - DOW - abstraction
- **Strategic Action:** MED priority - Shore bird studies (Peter Taylor) can be used as possible indicator species for monitoring
- **Strategic Action:** MED priority - Lobby for monitoring to keep a handle on water quality trends
- **Strategic Action:** MED priority - Inform landholders and land managers on fire best management practices for remnants
- **Strategic Action:** MED priority - Build knowledge base of fire history, any requirements for small cool fires
- **Strategic Action:** HIGH priority - Revegetation of key areas for biodiversity including buffering & connecting remnants
- **Strategic Action:** HIGH priority - Ensure that there are ongoing culling programs for Kangaroos
- **Strategic Action:** HIGH priority - Fencing priority remnants
- **Strategic Action:** HIGH priority - Develop decision making framework for optimising location of restoration works
- **Strategic Action:** HIGH priority - Implement new/known perennial pastures/ agroforestry/ other high water use options for agriculture

- **Strategic Action:** HIGH priority - Undertake hydrological assessments on key pilot priority sites to determine condition and future prospects

All Monitoring Indicators

Methods	Objectives	Key Indicator References by Target (w/Current Indicator Measurement)	Threat References by Target (w/Current Indicator Measurement)
Indicator: Area and condition of native veg			
-	-	Upper Kent Wetland Suite <ul style="list-style-type: none"> Landscape Context: Native vegetation adjoining the fringing vegetation West Balicup Wetland Suite <ul style="list-style-type: none"> Landscape Context: Native vegetation adjoining the fringing vegetation 	
Indicator: Area and condition of native vegetation			
-	-	Black gloved wallaby <ul style="list-style-type: none"> Landscape Context: Good quality habitat of sufficient size 	
Indicator: Availability of hollows for breeding and nearby food sources			
-	-	Carnaby's black cockatoo <ul style="list-style-type: none"> Size: Population recruitment 	
Indicator: Discrete populations within critical range			
-	-	Carnaby's black cockatoo <ul style="list-style-type: none"> Landscape Context: Genetic flows between populations 	
Indicator: Disturbance within natural regime			
-	-	Proteaceous rich shrublands/woodlands <ul style="list-style-type: none"> Landscape Context: Soil type and nutrient status 	
Indicator: Diversity of spp. age classes			
-	-	Proteaceous rich shrublands/woodlands <ul style="list-style-type: none"> Condition: Population structure & recruitment 	
Indicator: Fringing vegetation assessment			
-	-	Upper Kent Wetland Suite <ul style="list-style-type: none"> Condition: Fringing vegetation condition West Balicup Wetland Suite <ul style="list-style-type: none"> Condition: Fringing vegetation condition 	
Indicator: Number of animals / potential of suitable habitat occupied			
-	-	Black gloved wallaby <ul style="list-style-type: none"> Size: Population distribution and abundance 	
Indicator: Number/ percentage of potential suitable habitat occupied			
-	-	Black gloved wallaby <ul style="list-style-type: none"> Size: Distribution and abundance 	
Indicator: Physical, chemical and biological Ausrivis indices			
-	-	Upper Kent Wetland Suite <ul style="list-style-type: none"> Condition: Water quality West Balicup Wetland Suite <ul style="list-style-type: none"> Condition: Water quality 	
Indicator: Presence of key pollinators			

Methods	Objectives	Key Indicator References by Target (w/Current Indicator Measurement)	Threat References by Target (w/Current Indicator Measurement)
-	-	Proteaceous rich shrublands/woodlands • Condition: Pollination	
Indicator: range of ant activity			
-	-	Wandoo associated vegetation communities • Condition: Active soil fauna	
Indicator: Suite of fauna			
-	-	Wandoo associated vegetation communities • Condition: Active habitat for tree dwellers	
Indicator: TBD			
-	-	Carnaby's black cockatoo • Condition: Abundance of food resources Jarrah/Marri associated vegetation communities • Landscape Context: Population structure & recruitment • Condition: Species Composition • Condition: Tree health • Size: Patch size & shape Stirling Range outliers • Landscape Context: Connectivity among communities & ecosystems • Landscape Context: Fire regime - (timing, frequency, intensity, extent) Wandoo associated vegetation communities • Size: Patch size & shape	
Indicator: TBD (proximity to other Wandoo woodlands and to other veg communities)			
-	-	Wandoo associated vegetation communities • Landscape Context: Landscape pattern (mosaic) & structure	
Indicator: TBD - how important movement is and the affect of fences to restricting movement			
-	-	Black gloved wallaby • Landscape Context: Movement across the landscape	
Indicator: Trees have full crown			
-	-	Wandoo associated vegetation communities • Condition: Tree health	
Indicator: Understorey & recruitment			
-	-	Wandoo associated vegetation communities • Condition: Species composition / dominance	
Indicator: Vegetation assessment			
-	-	Stirling Range outliers • Condition: Population structure & recruitment	

Project Resources

Categories & Measures	Score
<hr/>	
People	
Staff Leadership	-
Multidisciplinary Team	-
People Average	-
Internal Resources	
Institutional Learning	-
Funding	-
Internal Resources Average	-
External Resources	
Social/Legal Framework for Conservation	-
Community and Constituency Support	-
External Resources Average	-
<hr/>	
Overall Project Resource Rank	None

Assessment of Target Viability

Conservation Target	Key Attribute (Category)	Indicator	Current Indicator Measurement	Rating Comments: (Poor, Fair Good Very Good)	Current Rating and Date	Desired Rating and Date
Upper Kent Wetland Suite	Fringing vegetation condition ¹ (Condition)	Fringing vegetation assessment ²	TBD - Check on Hopkinson 2003 method, use this or modified Pen Scott method of vegetation assessment	Poor: Little fringing vegetation, dead trees Fair: Reasonable fringing vegetation Good: Healthy fringing vegetation Very Good: Near pristine fringing vegetation	Fair ³ Sep 15, 2010	Good
Upper Kent Wetland Suite	Water quality ⁴ (Condition)	Physical, chemical and biological Ausrivis indices ⁵	TBD Ratings to be determined with CENRM and Department of Water to ensure consistency with wider south coast data bases	Poor: TBD Fair: TBD Good: TBD Very Good: TBD	Fair Sep 15, 2010	Good
Upper Kent Wetland Suite	Native vegetation adjoining the fringing vegetation ⁶ (Landscape Context)	Area and condition of native veg ⁷	% of subcatchment draining into wetland, vegetation condition assesment	Poor: - Fair: Lake nunijup Good: TBD Very Good: Lake Poorarecup, Kworricup	Fair ⁸ Sep 15, 2010	Good
Wandoo associated vegetation communities	Active habitat for tree dwellers ⁹ (Condition)	Suite of fauna ¹⁰	-	Poor: few tree dwelling species present Fair: some tree dwelling species present Good: many tree dwelling species present Very Good: all tree dwelling species present	Good ¹¹ Jul 7, 2010	Good
Wandoo associated vegetation communities	Active soil fauna ¹² (Condition)	range of ant activity ¹³	-	Poor: Poor diversity - few species dominate Fair: - Good: Good diversity of soil fauna Very Good: -	Fair ¹⁴ Jul 7, 2010	Good
Wandoo associated vegetation communities	Species composition / dominance ¹⁵ (Condition)	Understorey & recruitment ¹⁶	-	Poor: Poor understorey and limited age classes Fair: - Good: - Very Good: Excellent understorey and range of age classes	Fair	Good
Wandoo associated vegetation communities	Tree health ¹⁷ (Condition)	Trees have full crown ¹⁸	-	Poor: Original rating < 50% have full crown (new rating C4, C5, C6) Fair: Original rating: 60% have full crown (new rating C3) Good: New rating C2 Very Good: Original rating: > 85% have full crown (New rating C1)	Fair ¹⁹	Good
Wandoo associated vegetation communities	Landscape pattern (mosaic) & structure ²⁰ (Landscape Context)	TBD (proximity to other Wandoo woodlands and to other veg communities) ²¹	-	Poor: No rufus tree creepers Fair: Some rufus tree creepers Good: many rufus tree creepers Very Good: lots of rufus tree creepers	Fair ²² Jul 7, 2010	Good

Conservation Target	Key Attribute (Category)	Indicator	Current Indicator Measurement	Rating Comments: (Poor, Fair Good Very Good)	Current Rating and Date	Desired Rating and Date
Wandoo associated vegetation communities	Patch size & shape ²³ (Size)	TBD	-	Poor: Few large patches over 20 ha, many skinny roadside patches Fair: Some patches over 20ha - squarish solid blocks Good: Many patches over 20 ha, some patches over 100 ha Very Good: Pre European sizes (100s of hectares)	Poor	Good
Proteaceous rich shrublands/woodlands	Pollination ²⁴ (Condition)	Presence of key pollinators ²⁵	-	Poor: few pollinators Fair: - Good: - Very Good: lots of pollinators	Fair Sep 15, 2010	Good
Proteaceous rich shrublands/woodlands	Population structure & recruitment ²⁶ (Condition)	Diversity of spp. age classes	-	Poor: few proteaceae, old and senescing trees, dieback possible Fair: some proteaceae, some variation in age classes, dieback not evident Good: - Very Good: all representative spp, range of age classes, no dieback	Fair ²⁷ Sep 15, 2010	Good ²⁸
Proteaceous rich shrublands/woodlands	Soil type and nutrient status (Landscape Context)	Disturbance within natural regime	-	Poor: weedy understorey or eroding surface, evidence of sand drifts, evidence of rabbits Fair: - Good: - Very Good: few weeds, no erosion evidence, no rabbits	Fair Sep 15, 2010	Good ²⁹
Black gloved wallaby	Good quality habitat of sufficient size (Landscape Context)	Area and condition of native vegetation ³⁰	TBD	Poor: Little understorey, open woodland Fair: - Good: - Very Good: Thick understorey in big patches	Fair ³¹ Sep 15, 2010	Good ³²
Black gloved wallaby	Movement across the landscape ³³ (Landscape Context)	TBD - how important movement is and the affect of fences to restricting movement	-	Poor: lots of fences/ roads affecting movement Fair: some fences/roads affecting movement Good: few fences/roads affecting movement Very Good: No fences/roads affecting movement	Fair ³⁴	Good
Black gloved wallaby	Distribution and abundance ³⁵ (Size)	Number/ percentage of potential suitable habitat occupied	-	Poor: Nil (Alternative - 0-25% sites occupied) Fair: Breeding groups present (Alternative 25-50% of sites occupied) Good: breeding groups genetically interacting (Alternative 50-75% of sites occupied) Very Good: breeding groups thriving (Alternative 75-100% of sites occupied)	Fair ³⁶	Good

Conservation Target	Key Attribute (Category)	Indicator	Current Indicator Measurement	Rating Comments: (Poor, Fair Good Very Good)	Current Rating and Date	Desired Rating and Date
Black gloved wallaby	Population distribution and abundance (Size)	Number of animals / potential of suitable habitat occupied	TBD	Poor: 0-25% of sites occupied Fair: breeding groups present - 25-50% of sites occupied Good: breeding groups genetically interacting - 50 - 75% of sites occupied Very Good: breeding group thriving - 75 - 100% of sites occupied	Poor ³⁷ Sep 15, 2010	Fair
Jarrah/Marri associated vegetation communities	Species Composition ³⁸ (Condition)	TBD	-	Poor: Low diversity, density and health of understorey (unhealthy/dead proteaceous heath) Fair: Proteaceous heath present Good: Proteaceous heath healthy Very Good: Healthy, diverse, dense understorey mix (Proteaceous heath in excellent condition with recruitment)	Fair	Good
Jarrah/Marri associated vegetation communities	Tree health ³⁹ (Condition)	TBD	Modify from Wandoo crown condition as follows: C1, (75-100% crown cover), C2 (45 - 65% crown cover), C3 (20-30%), C4 (10% crown cover)	Poor: - Fair: - Good: - Very Good: -	Fair	Good
Jarrah/Marri associated vegetation communities	Population structure & recruitment ⁴⁰ (Landscape Context)	TBD	-	Poor: only old trees Fair: - Good: mix of age classes Very Good: -	Fair	Good
Jarrah/Marri associated vegetation communities	Patch size & shape ⁴¹ (Size)	TBD	Map from existing Beards veg mapping	Poor: - Fair: - Good: - Very Good: -	Fair	Good
Carnaby's black cockatoo	Abundance of food resources ⁴² (Condition)	TBD ⁴³	-	Poor: insufficient food sources within 12km - will need to fly more (can fly up to 20km per trip to get food) but this will diminish the breeding success. Fair: sufficient food sources within 12 km of a nesting hollow Good: sufficient food sources within 5 km of a nesting hollow, and some abundant (high quality) within 12km Very Good: abundant food resources (TBD) - proteaceous stuff within 5km of a nesting hollow	Fair ⁴⁴ Sep 15, 2010	Fair
Carnaby's black cockatoo	Genetic flows between populations ⁴⁵ (Landscape Context)	Discrete populations within critical range ⁴⁶	-	Poor: - Fair: - Good: - Very Good: -	Fair ⁴⁷ Sep 15, 2010	Good ⁴⁸
Carnaby's black cockatoo	Population recruitment ⁴⁹ (Size)	Availability of hollows for breeding and nearby food sources	Number of hollows utilised for nesting	Poor: Few hollows Fair: - Good: - Very Good: Many hollows food within 12km	Poor ⁵⁰ Sep 15, 2010	Fair
Stirling Range outliers	Population structure & recruitment (Condition)	Vegetation assessment	-	Poor: - Fair: - Good: - Very Good: -	Good ⁵¹ Sep 15, 2010	Very Good

Conservation Target	Key Attribute (Category)	Indicator	Current Indicator Measurement	Rating Comments: (Poor, Fair Good Very Good)	Current Rating and Date	Desired Rating and Date
Stirling Range outliers	Connectivity among communities & ecosystems ⁵² (Landscape Context)	TBD	-	Poor: - Fair: - Good: - Very Good: -	Good ⁵³ Sep 15, 2010	Very Good ⁵⁴
Stirling Range outliers	Fire regime - (timing, frequency, intensity, extent) ⁵⁵ (Landscape Context)	TBD	-	Poor: - Fair: - Good: - Very Good: -	Good ⁵⁶ Sep 15, 2010	Very Good
West Balicup Wetland Suite	Fringing vegetation condition (Condition)	Fringing vegetation assessment	TBD - Check on Hopkinson 2005 method, use this or modified Pen Scott method of vegetation assessment	Poor: Little fringing vegetation, dead trees Fair: Reasonable fringing vegetation Good: Healthy fringing vegetation Very Good: Near pristine fringing vegetation	Fair ⁵⁷ Sep 15, 2010	Good
West Balicup Wetland Suite	Water quality ⁵⁸ (Condition)	Physical, chemical and biological Ausrivias indices	TBD Ratings to be determined with CENRM and Department of Water to ensure consistency with wider south coast data bases	Poor: TBD Fair: TBD Good: TBD Very Good: TBD	Good ⁵⁹ Sep 15, 2010	Good
West Balicup Wetland Suite	Native vegetation adjoining the fringing vegetation ⁶⁰ (Landscape Context)	Area and condition of native veg	% of subcatchment draining into wetland, vegetation condition assesment	Poor: TBD Fair: TBD Good: TBD Very Good: TBD - includes 100s of meters of buffer	Fair ⁶¹ Sep 15, 2010	Fair ⁶²

COMMENTS:

- The condition of fringing vegetation around wetlands is very important for the long term survival of these systems. Fringing vegetation plays an important role in hydrological balances, habitat values, buffering from neighbouring farming activities to name a few. Furthermore the condition of fringing vegetation may reflect the changes brought about by altered catchment hydrology. Hopkinson (2003) notes that in many cases (e.g. Lake Nunijup) the lakes may have once been sumplands, covered in emergent rushes or yates/paperbarks, but due to changed hydrology have become permanent water bodies with fringing vegetation only.
- These categories do not match up completely with Hopkinson (2003) completely - he also used four main categories: Poor, Moderate, Good and Excellent, but included grades between categories. Need to check on rationale behind his categorisation
- There are a range of conditions of wetlands in the Hopkinson (2003) report. This fair rating will need to be reviewed for the Upper Kent Catchment as well as investigated for other wetlands in the Forest to Stirlings area.
- This is a standard measurement of water quality that has been used elsewhere
- Hopkinson (2003), looked at the salinity of a range of wetlands in the Upper Kent Catchment, from these results saline wetlands did not necessarily mean poor condition, indeed some wetlands ranked highly were saline (need to distinguish between primary and secondary salinity)
- Buffering effect and hydro balance
- These lakes are indicators of the condition and size
- Good buffer with no direct farm influence, biodiversity benefit, hydrological catchment for each individual wetland, % of a larger area
- Antichinus will forage 500 m from a patch of bush (Peter Luscombe) - occur at Peter's place, pygmy possums occur at Heather and Judy's place Bees commandeering hollows are a problem - need to be addressed Rufus tree creepers are still active in the Ranges link Ranges link group notes that honey possums are still seen from time to time
- Confidence of these indicator rating descriptions: High
- W Bradshaw author of a report on the ecological connections between Stirling Ranges and Southern Forests & P. Luscombe, respected local ecologist and long term landholder and revegetation expert in this region Confidence of the current rating: High
- For areas that are fenced the fauna would be good but poor if it is not fenced This includes a range of fauna species including insects, other invertebrates, fungi eaters e.g. bandicoots - (Ranges Link) group notes that bandicoots are still seen around Could attain baseline data by having students doing pitfall traps in Wandoo Woodland - Jonathan Majer (as per Fitzstirling studies) Would be good to know what the suites of species are to watch out for - simple indicators - potential to use ongoing student groups from CENRM to monitor over time
- Confidence of these indicator rating descriptions: High
- W Bradshaw author of a report on the ecological connections between Stirling Ranges and Southern Forests & P. Luscombe, respected local ecologist and long term landholder and revegetation expert in this region Confidence of the current rating: High
- Wandoo is known to be at severe risk from Wandoo crown decline, etc etc. How to measure - density? may be open naturally - should density of wandoo trees be a measure Look at existing reports - link wandoo recruits and understorey - look at existing work to get an indicator Wandoo is susceptible to Bridal

Creepers - rating would include weeds etc. Estimate condition for existing reports. Peter - monitor the revegetation patch that he has done - the old trees had a lot of deaths etc. to see how it improves over time - both understorey, old trees and recruitment

16. Need healthy understorey and a range of age classes of wandoo

17. Wandoo is known to be at severe risk from Wandoo crown decline, a condition caused by a combination of factors, climate, tree physiology, pests and diseases, possibly all exacerbated by stresses caused by grazing, nutrients, chemicals and extended dry periods The Ranges Link group noted that they estimated that a rating of 60% of trees having a full crown correlated with the fair rating for this target & other values were estimated The Wandoo Recovery Group have a number of monitoring standards for determining crown decline as follows: C1, (75-100% crown cover), C2 (45 - 65% crown cover), C3 (20-30%), C4 (10% crown cover) - need to confirm ranges and do some field measurements

18. Best estimate based on observation by current team present. Need to research Wandoo Recovery Group information & calibrate after a few field measurements. Confidence of these indicator rating descriptions: High

19. Long term observation of area by P. Luscombe Confidence of the current rating: High

20. Wendy Bradshaw (Sept 2010) - Rufous tree creepers are an indicator of connectivity as they need to breed with other populations for viability - disappeared from a patch near her house - assume that they moved off for breeding purposes (Keith - rate of woodland drop out in last 10 years reduced very quickly) Compare to pre-European extent, western end of the Stirlings as an indicator. Need GIS analysis Link up to Centre of Excellence for Woodland Health - Murdoch Uni and reports online - WWF - Woodland Watch & Paula Half the wandoo is fine and the other half is in decline - how do you set viability ratings without dumbing down/averaging it all out so that it all looks mediocre Comment from 2007/08 workshops: Highly cleared landscape with many small patches isolated from each other and other remnant vegetation. Possible reduced genetic viability (indicator may be < 200 individuals of each species within 1 kilometre - needs verification). Focal species such as mycophagous mammals are unable to move through the landscape hindering ecosystem processes such as translocation of fungal spores and incorporation of organic matter into soil.

21. Confidence of these indicator rating descriptions: High

22. W Bradshaw author of a report on the ecological connections between Stirling Ranges and Southern Forests & P. Luscombe, respected local ecologist and long term landholder and revegetation expert in this region Confidence of the current rating: High

23. Wandoo is known to be at severe risk from Wandoo crown decline, etc etc. Patches may be very small - even five trees - birds can use these as stepping stones - not necessarily size of patches but the connectivity - what is a critical distance apart for birds, for insects it may be that patches 2 km apart from one another are fine (Peter Luscombe) Look at Stirlings Management stuff - SW Stirlings to get values for what is GOOD

24. pollination is fundamental to seed set & recruitment

25. Paula has a book on pollinators, Liz Brown et al Pollination in Western Australia A Data base....

26. Need key groups of proteaceae to be able to recruit

27. Western side better condition - eastern side especially around Balicup wetlands - poor - on average fair

28. Where they are protected from stock and relatively isolated (from dieback spread) on a farm are in better condition

29. Need more examples to look at to determine patch size, edge to area ratio, rabbits etc.

30. Need dense prickly cover of understorey-mid - up to 2m, of sufficient size TBD

31.

32. Difficult to generalise across the whole area - habitat quality varies along the area - better along macro corridor line Some habitat too long interval between fires (Wendy) - in proteaceous community

33. It is thought that movement of wallaby populations across the landscape is important for gene flow and vigor within the species. It is assumed that fences such as the one along the southern border of the Stirling Range National Park, as well as some roads, have a negative impact on this movement across the landscape. The extent to which this is occurring needs to be investigated further

34. Judy doesn't have wallabies - need to check how fences affect - can't get through ring lock - but can get through plain wire but so can sheep - suggestion Heather's patch 50 ha & Kamballup reserve - same sort of size - but Judy's bush - no wallabies Do a map of current distribution - where they currently are - may indicate that they are in the larger patches

35. This refers to sufficient numbers of wallabies for successful breeding. Sandra Gillfinnan's work on this species and Tammar wallabies for the Fitz-Stirling have give some baseline information as to the percentage of occupied sites in the area, the fair rating of 36% of sites occupied was to be increased to 50% of sites occupied to achieve a "good" rating. However, further work is required to determine if occupied sites means that successful breeding is taking place. Remote camera work may be able to assist in this regard.

36. Biggest threat to the south - packs of dogs - Lucia's area But not at Heather's place - no stray dogs Northern part of the range is less likely to have feral dogs - also more shooting north, less baiting to the south Note if there is a strategy to increase fox baiting the dogs will be taken as well

37. Need to do some more observations (roo shooters) Populations in Stirlings and WWA and along Muir highway (?) Bill saw one at Lake Nunijup recently (Aug 2009)

38. Comments from Ranges Link: Healthy understorey and needs to have proteaceae in the mix Health of crown for Jarrah (Jarrah leaf miner) & Marri (borer was affecting these) Natural recruitment Add the presence of proteaceous heath to the jarrah marri as the indicator Needs appropriate fire regime and feral control esp. rabbits, foxes etc. Comments from Forest to Stirling Poorer on private land, much better in reserves, Jarrah does not tend to get that weedy - more weedy susceptible in Marri-Jarrah woodland (Marri woodland seems to be weed free - Bill Hollingworth - due to shading effect)

39. Similar to Wandoo Tree Decline - indicator ratings to be determined

40. Complex systems across varying soils from sand to laterite. Phytophthora an issue. Poorer on private land, much better in reserves, Jarrah does not tend to get that weedy - more weedy susceptible in Marri-Jarrah woodland (Marri woodland seems to be weed free - says Bill Hollingworth - due to shading effect)

41. This is the most prevalent vegetation in this system - in the southern half at least. i.e. remnants are the most prevalent - but may not have been the most prevalent vegetation in pre-European times, predominate vegetation would have been Wandoo and Mallee on siltones (clayloam) - the reason for most rem veg in

- Jarrah Marri today is less nutrients & poorer soils for agricultural and only started with clearing once the trace elements were introduced - 1960s- 1980s
42. If the birds dont have hollows they will not breed and they will not take up a hollow (measured by nesting boxes) unless they are within 12km (Wendy Bradshaw, pers comm 2010 - Via Raana). Even if the birds are around and there are food resources - they are currently not taking up new nesting boxes (unless they have been nesting there historically) - e.g new nesting boxes at Yarabee and Peniup - not used even though birds are there and feed is there - but need more baseline information Eddy Wajon - were nesting up to the point of a fire - then artificial nesting boxes were place soon after - 2007 - taken approx - 3or 4 years until they are now being used - Eddy Wajon recently flushed a hen from a tube Need sufficient proteaceous, leguminous and other food sources within range of foraging
 43. Talk to Raana
 44. need to talk to Raana to test assumptions
 45. need to prevent genetic bottlenecks
 46. Talk to Raana about broader pop dynamics, sizes ranges etc.
 47. need to talk to Raana to test assumptions
 48. WE dont know
 49. If the birds dont have hollows they will not breed and they will not take up a hollow (measured by nesting boxes) unless they are within 12km (Wendy Bradshaw, pers comm 2010 - Via Raana).
 50. See Raana Scotts work Maybe seeing a strong decrease - need more information
 - 51.
 52. Need a range of pollinators - birds, mammals, insects etc. within a critical distance (their range) of the remnant - e.g. Geekabee hill isolated by XXm from others
 53. Not sure of the pollinator issues,
 54. Need to find out more about pollination possibly PHD study to look at recruitment issues
 55. Need to know more - what the optimum level will be - talk to Preston family for Geekabee hill - may be decades at a certain intensity, season etc.
 - 56.
 57. Not sure of the pollinator issues,
 58. Note: Hopkinson (2005) notes that most of the wetlands in the basin floor are naturally saline with no emergent vegetation, and so are able to tolerate increases in salinity and longer periods of inundation. Semenuik (1999), in Hopkinson (2005) notes that the effects on aquatic invertebrates are not as clear.
 - 59.
 60. Public land good condition - in some areas there is extensive rem veg buffering the fringing veg around wetlands Assessment needed to look at the amount of native vegetation buffering the fringing vegetation. A look at the remnant vegetation on maps shows a range of remnant vegetation around different wetlands ranging from a lot of vegetation to very little Hopkinson (2005) notes that in some of the shire and nature reserves there are 100s of meters of vegetation that provide a buffer to fringing vegetation
 61. Not sure of the pollinator issues,
 62. Need to find out more about pollination possibly PHD study to look at recruitment issues

Strategy Effectiveness

Objective: To improve the condition and connectivity of Jarrah/marri associated vegetation communities in the Forest to Stirlings Functional Landscape by 2015. **Percent Complete: 0%**

Objective: To improve the condition and connectivity of Wandoo associated vegetation communities in the Forest to Stirlings Functional Landscape by 2015. **Percent Complete: 0%**

Objective: To improve the condition and conservation status of Proteaceous rich shrublands/woodlands in the Forest to Stirlings Functional Landscape by 2020. **Percent Complete: 0%**

Objective: To improve the condition of the West Balicup Wetland Suite in the Forest to Stirlings Functional Landscape by 2020. **Percent Complete: 0%**

Objective: To improve the habitat and conservation status of black cockatoos in the Forest to Stirlings Functional Landscape by 2015. **Percent Complete: 0%**

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. **Percent Complete: 0%**

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. **Percent Complete: 0%**

Objective: To improve the management and condition of biodiversity in the Upper Kent Wetland Suite in the Forest to Stirlings Functional Landscape by 2020. **Percent Complete: 0%**