REVEGETATION OF FARMS – IMPACTS ON WOODLAND BIRDS & BATS

Rod Bird

Presentation for a meeting of Hamilton SGAP, 8 Aug 2012

My aim is to outline some of the research and the outcomes of studies into revegetation and impacts on fauna. Research by Birds Australia, Deakin University, CSIRO and the University of Adelaide has shown an alarming decrease in the number of woodland bird species with declining tree and shrub cover in the rural landscape. Why does it matter? One important practical reason is that a diverse population of birds can remove 70% of leaf-feeding insects from patches of farm trees – without the birds tree dieback occurs. Studies by DSE has also shown how important paddock trees are to bats and the role of bats in insect control.

Land for Wildlife Vol 9 No1 (2012) lists Grey-crowned Babbler, Superb parrot, Hooded Robin and Bush Stone-curlew as examples but suggest that from 2002-2007 66% of all species (nectar-feeders, ground feeders or shrub feeders) had declined in numbers. The decline occurred in large forest patches as well as small woodland patches. Thus, there may be links to climate change, affecting habitat quality. HFNC data from eight 2-ha sites visited 6 times (April-June) in the Grampians in 2009 (Matt Divini's Monash Univ Hons project) also was of concern. We saw only 40 species (Grampians has about 160) and a maximum of only 10-20 for any site visit in the 4 long-unburned areas and 10-15 in 3 recently-burned plots. Sampling over the whole year would include migratory species. The Jan 2006 fires may have contributed to this result.

David Freudenberger (CSIRO) conducted research in the Boorowa River area of NSW. He found:

- some species *could* live in an area regardless of habitat simplification ('common species')
- other species *could not* live in an area (regardless of size) if tussocks, shrubs or logs were absent
- some species *could not* live in a small area, regardless of its flora composition or structural complexity – patch size, not connectivity or structure, was the factor that most limited most species

Birds Australia's "*Birds on Farms Survey*" (1995-99) on 330 farms in southern Australia – factors influencing site occupation – see Geoff Barrett's report in the supplement to *Wingspan* Vol 10, Dec 2000. The data collected enabled a statistical analysis to be made – key facts and statistical trends were:

1. local native vegetation cover of at least 30% of the farm is needed for long-term sustainability
2. bird diversity declined in woodland patches smaller than 10 ha
3. woodland-dependent birds and ground-foraging birds were 12% more diverse on strips ≥50 m wide
4. woodland-dependent birds were 8% more diverse on sites having 2 or more tree species
5. woodland-dependent birds were 21% more diverse on sites with natural regeneration v. planted
6. small foliage-gleaning birds were 26% more diverse on sites with natives v. exotic planting
7. bird diversity was less on sites where ploughing had occurred over more than 25% of the area
8. bird diversity was re-established about 15 years after stock removal from a heavily grazed site
9. ground-foraging birds were 16% more diverse on sites with native pasture
10. understory birds were 5% more diverse on sites never grazed or 9% less diverse when mostly grazed
11. total bird diversity was 25% less on sites where most of the ground cover had been reduced to tufts
12. exotic birds were 51% more diverse in isolated farm sites
13. woodland-dependent birds were 31% more diverse on sites surrounded by other woodland
14. bird diversity increased by 30% for every 10 large trees present at a farm site
15. woodland-dependent hollow-nesting birds increased by 20% for every 10 large trees present
16. bird diversity increased 5-10 years after trees were planted but woodland dependent ground foragers responded after about 35 years
17. ground-foraging birds increased by 30% and bark-foraging birds by 70% for every 10 fallen trees
18. total bird diversity was greater on sites with leaf litter, particularly when it was present in clumps
19. woodland-dependent birds were 31% more diverse on sites with understorey shrubs
20. small forage-gleaners were 24% more diverse on sites with understorey shrubs
21. Noisy Miners were 78% less likely to occur in sites where understorey shrubs were present
22. Ground-nesting birds were almost 3 times as diverse where understory was present
23. woodland-dependent birds were 21% more diverse on sites with a river or creek line
24. small birds were 28% more diverse and ground-nesters 29% more diverse with waterways present
25. bird diversity increased by only 3% with each additional farm dam
26. for every 10 m increase to the nearest permanent water there was a 10% decrease in waterbird diversity and a 5% decrease in ground-nesting birds
27. one of dense shrubby layer, shallow areas, islands or dead trees, or fencing of the wetland to exclude livestock, gave a 14% increase in waterbird diversity. Each extra feature added another 14%.

Richard Loyn (DSE) – groups of patches larger than 10-25 ha support as many forest bird species as single patches of equivalent size (Loyn 1985). But small areas, and isolated or simplified woodlands, will not sustain large numbers of species (e.g. vulnerable Hooded Robins, Diamond Firetails or Stone-curlews).

Andrew Bennett, Rohan Clarke *et al*. Deakin Univ – (2006-08) – research in SW Vic. suggest that below about 10-30% tree cover many species are threatened. Revegetation of 10-15% of landscape increased species numbers by about 15 where little remnant vegetation existed. For the total area of wooded cover (0-20%), a mix of revegetation and remnants was almost as good as the remnants alone, but revegetation alone was inferior by up to 20 species. However, revegetation at any level of remnant vegetation in the landscape is likely to increase birds species richness – but are these just '**common species**'? (see David Paton, p. 3).

A Revegetation Recipe from Geoff Barrett & David Freudenberger's reports

1. **Bush remnants and revegetation should cover 30% of the farm**.
   - *Aim for large patches of native vegetation, linked by wide strips of planted vegetation*
     - Enlarge the remnants, if possible to 10 ha – with corridor strips up to 50 m wide.
   - *Protect remnant vegetation and/or re-create local conditions* – the order of priority is:
     - Protect remnants first – begin by fencing the largest and those with a complex understorey.
     - Then assist natural regeneration in the fenced remnant stands
     - Then, where regeneration is poor, plant or direct-seed local native grasses and shrubs.
2. **Links between patches of bush**
   - *First, link protected remnants further than 1.5 km from other large remnants* **–** the corridors should have planted or direct-sown strips at least 20 m wide (5-7 rows). Or establish '***stepping-stones***' of large blocks. Include watercourses and other habitats in corridors.
   - *Then link protected remnants that are closer than 1.5 km to other large, protected remnants*.
   - *Then link unprotected remnants* **–** this has the lowest priority, until such areas are enhanced.
3. **Shrubs and understorey**
   - *Shrub cover is needed in at least 30% of the patch of trees* – fairy-wrens, scrubwrens, many thornbills and other species cannot occupy a site that has no understorey to provide protection and food.
   - *Fencing is needed to protect the understory* - whilst some grazing can be desirable, uncontrolled grazing will cause the loss of many species of plants and degrade the understory.
4. **Standing dead trees and large old trees**
   - Large, old trees with hollows are vital for wildlife – most trees <70 cm in diameter contain few hollows. Hollows are required by 57 species of birds (kingfishers, tree martins, pardalotes, some ducks and most parrots and owls nest in hollows), and bats and small arboreal mammals.
   - Birds and gliders seek old, large trees when they are flowering, in preference to younger trees.
5. **Logs and leaf litter**
   - *Retain fallen trees and leaf litter* – Many birds, including Bush Stone-curlews and Spotted Nightjars, together with insects, lizards and other animals, need this material in order to occupy the site. Robins, flycatchers, thornbills, treecreepers and babblers, feed on and among logs and fallen branches.
6. **Flowering species**
   - Avoid planting too many nectar-producing shrubs because that may result in the area being dominated exclusively by Red Wattlebirds, Miners and New Holland Honeyeaters.
7. **Water points in or near the remnant areas**
   - All seed-eaters need water but most will travel quite a distance to obtain it.
   - Most insectivorous birds do not need a source of water and, if water is provided, their numbers may be suppressed by species such as Noisy Miners, or dominated by Galahs and other parrots.
8. **Native grassland that is fenced to allow management of grazing**
   - Do not apply fertilisers to native pasture because that will promote the invasion of weeds
   - Do not set-stock native pastures – use tactical grazing and spell at strategic times to allow seed to be set in spring-summer and seedlings to establish in winter.
9. **Control cats and foxes**
   - Feral cat and fox numbers will increase when more cover is provided – a routine program of shooting or baiting may be needed.
   - Co-ordinated campaigns with neighbours are likely to be the most effective approach.
10. **Streams and Wetlands for water birds**
    - Tree, shrub and grass cover will protect the water from nutrient runoff and provide cover for birds. Ideally, the buffer should be 100 m each side of a river or 50 m each side of creeks and small gullies.
    - Waterbirds and their food sources need a diverse habitat, obtained by having a range of water depths. Some areas that dry out seasonally are essential for the health of the ecosystem.
    - Retain dead trees and logs in or around the wetland for perches and nesting purposes.
    - Blocking drains that were installed many years ago can restore wetlands.

Prof. David Paton, Univ. of Adelaide (see www.bior.org.au) – woodland birds Mount Lofty Ranges area.

1. Large areas (over 100 ha) are required for survival of woodland birds. The home range of Varied Sittella is ~250 ha, Restless Flycatcher ~ 185 ha and Brown-headed Honeyeater ~ 66 ha. The area needed to be planted was about 30% if up to 50 species were not to become regionally extinct.
2. Woodland bird species have declined drastically now as a result of clearing before 1980.
3. The decline will continue unless the area of the remaining (and new) blocks is increased.
4. Structural features are vital in revegetation ("untidiness" – fallen logs, low bushes and grasses).
5. Agroforestry, shelter and landscape planting contained only common birds (species that can tolerate poor structure and other factors) – most revegetated sites did nothing for the declining species.
6. Corridors were almost useless because they were expensive, had large edge effects, poor structure and small patch size that prevented most species from staying or breeding.
7. Need to restore LARGE areas – whole farms (or blocks greater than 100 ha) must be retired.
8. A "Future Fund" – people could contribute e.g. as a way of off-setting Carbon production. This would be tax-deductible. The fund would only use income generated annually and not the capital.

CORRIDORS

Bill Middleton – roadside vegetation in the Wimmera

In the 1960s or 1970s, Bill conducted a monthly survey of birds in a roadside near Dimboola. Of the 200-odd birds in the Wimmera, Bill saw about 80 of those species in the roadside in some month and about 30 nested there. However, only about 10 were seen there in every month of the year. The data shows how important corridors are for migrating birds that move through the landscape. It also indicates that few species can live in a relatively narrow belt of vegetation, probably as a result of competition for scarce resources, lack of key habitat requirements and increased predation as a result of large edge effects.

Land for Wildlife Vol 9 No1 (2012) suggests the following attributes are required:

1. Corridor should be continuous and link areas of wildlife habitat
2. Corridors should contain a diverse vegetation – trees, shrubs, ground cover, logs and litter
3. Corridors should be wide enough for fauna to live in as well as move through
4. Corridors should be managed to maintain habitat requirements of wildlife.

Additional suggestions in *Land and Wildlife* as to where corridors might be created and managed

1. streamsides, along existing fencelines, rocky hilltops and disused rail and road reserves
2. co-operative action among adjacent landholders to link habitat areas
3. replace an old fence on a road reserve by moving into the paddock to enlarge the corridor – natural regeneration from seed sources in the reserve may achieve effective revegetation in the new area.

HOW TO PROCEED? In SW Vic the average amount of remnant vegetation on farms in the Glenelg Region is only 8 ha! That represents about 1-3% of remnant vegetation on the average farm of 601 ha in the 4 million farm hectares (Amitharajah & Kearney – Glenelg Salinity Implementation Survey, DNRE 1995). Clearing by stealth continues and the new plantings by Landcare groups and individual farmers do not compensate. Thus, from 1990-95, 2544 ha of bush were cleared in Victoria but only 674 ha were planted (C Miller in The Age 28 May 1999). How are we to implement Freudenberger's, Birds Australia & Paton's proposals – we have so few remnants, we are losing more than is replaced, with added pressure in 2011 from a farmers' group (VFF) to ease the vegetation clearance rules? And what of David Paton's "Future Fund" proposal to acquire and revegetate large blocks on farms? Is that something for the State Government to do?

What landscape solution is there? The following suggestions might be considered:

- *Include the network of public land in the landscape* – it should contribute to a regional goal of 30% woodland cover. As well, ensure that Shires, Departments and fire brigades are aware of the need to maintain and increase native vegetation on the road and rail reserves. Help them to do so.
- *On farms, focus first on a single large area* – one large, well-managed natural area on the farm is much better than many smaller blocks having the same total area. A narrow belt is NOT good.
- *Work with neighbours and Landcare groups* – combining resources may enable a large patch (>10 ha) of vegetation on shared boundaries to be conserved. Small areas are ineffective for wildlife.
- *Consider roadsides and other reserves in the plan.* Widen the reserve by fencing an adjacent strip in your property. This could provide the additional width required to give a viable corridor of 50 m width (and >10 ha in area) – natural regeneration or direct seeding might provide the revegetation.
- *Find areas that are uneconomic to farm intensively* (i.e. costs of fertiliser, fuel, time and other costs exceed returns) in order to get the 30% area – parts might be available for strategic grazing. In any case, modelling studies indicate that at least 10 % of a farm can be replanted without long-term loss.
- *Lobby Local and State Government for rate relief* for revegetated areas removed from production.

BATS

'***Bats and Paddock Tree – insights from recent research***' see DSE [www.nre.vic.gov.au/notes/] – a 4-page production in 2003 from Lindy Lumsden (DSE) and Andrew Bennett (Deakin University).

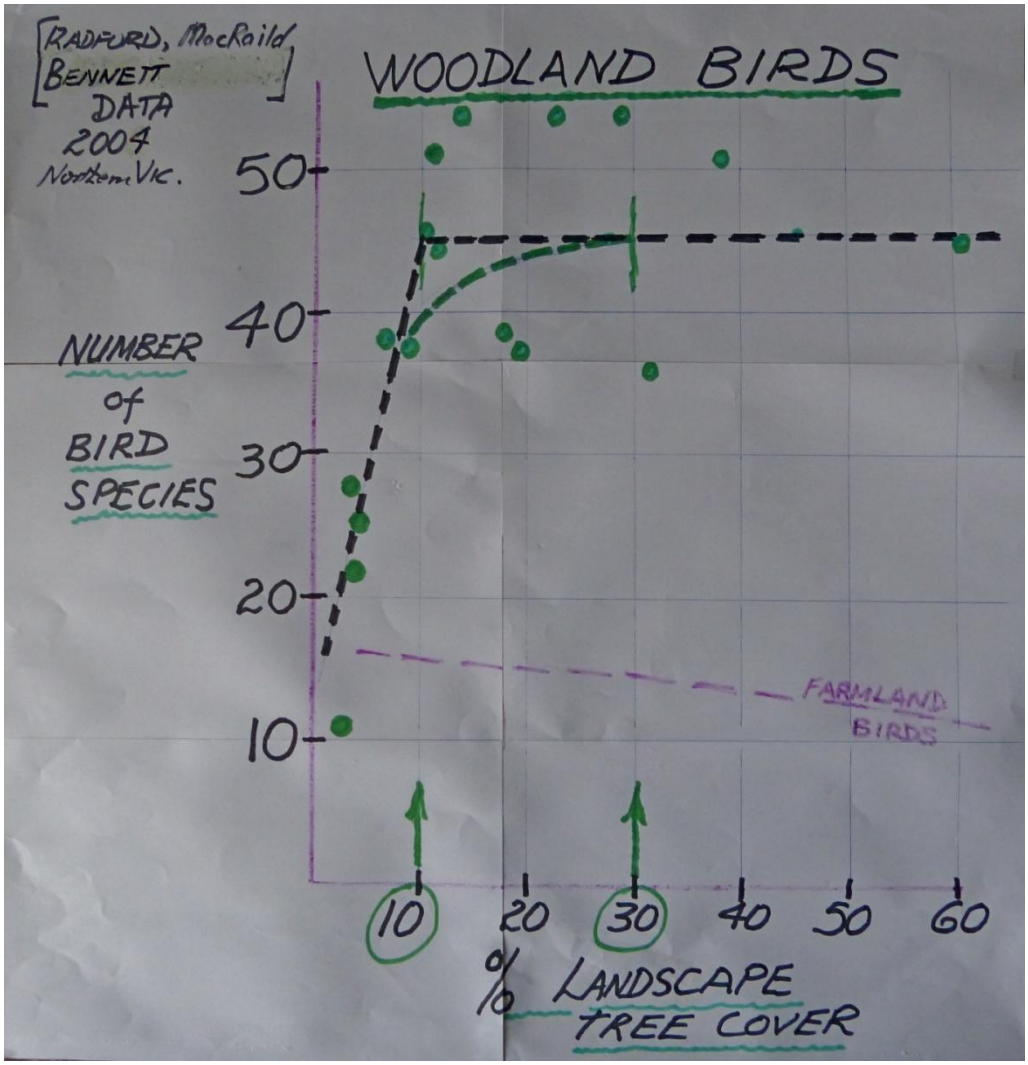
- Bats eat moths, beetles & bugs; some species also take mosquitoes, grasshoppers, crickets & spiders (individuals can ingest up to 50% of their body weight in a night and some bats have caught up to 600 mosquitoes in an hour)
- Bats forage around trees on streamsides, small remnants and isolated paddock trees
- As tree density decreases so does the number of bats and the greatest activity was seen at 20-30 trees/ha – but, in contrast to birds, every species was seen around sparsely scattered trees.
- Bats play an important role in reducing insects around sparsely scattered trees because there are few insect-eating birds in those situations
- Bats may fly more than 10 km in a night (40 km recorded by a Bentwing Bat at Naracoorte)
- Bats roost in tree hollows and in cracks under bark and some in farm buildings

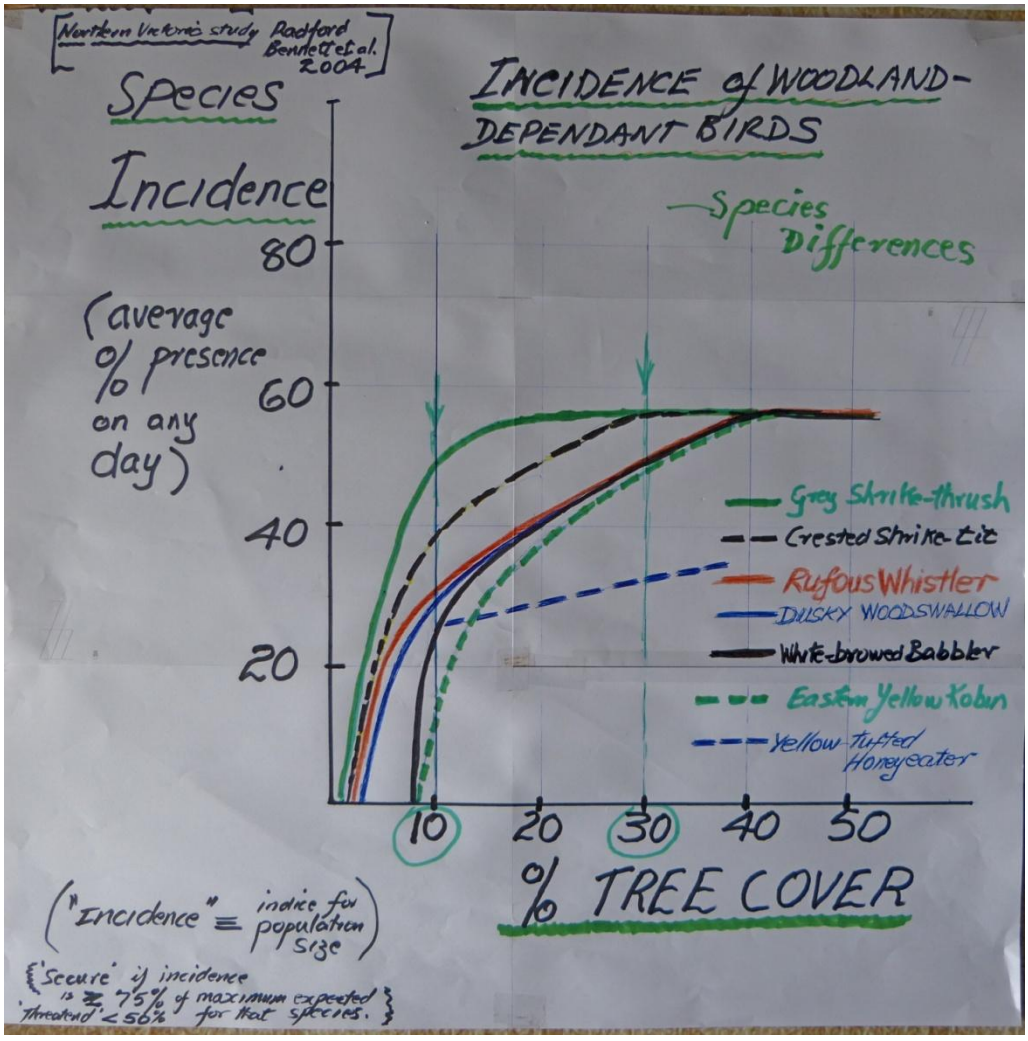
'*Bat Ecology and Conservation'* – see **SWIFFT web-site** – several speakers addressed the July meeting in 2012.

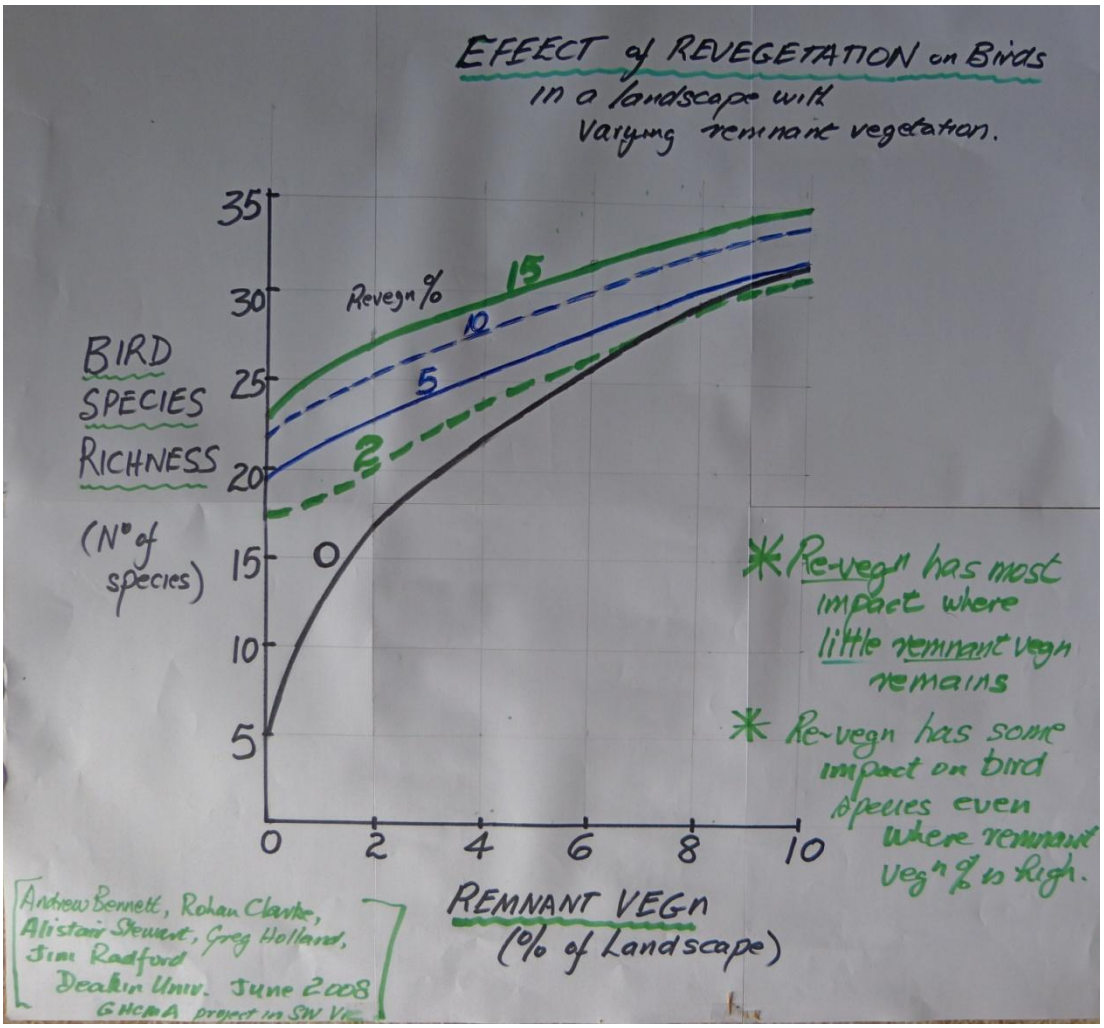
- **Insectivorous bats of Victoria and south-eastern South Australia; bat ecology, conservation status and threats** – Dr Lindy Lumsden, Senior Scientist, Wildlife Ecology, Dept. of Sustainability and Environment, Arthur Rylah Institute, Heidelberg.
- **Southern Bent-wing Bat habitat, population decline and threats** - Steve Bourne, formerly DENR South Australia, currently Director of Planning and Environment, Naracoorte – Lucindale Council, South Australia.
- **Southern Bent-wing Bat research at Naracoorte Caves** – Kristen Lear, US Fulbright Post Grad. with the Department of Environment and Natural Resources South Australia., in partnership with the University of Melbourne.
- **Southern Bent-wing Bat and windfarms**– overview of impacts, threat assessment and monitoring – Mark Venosta, Biosis Research.

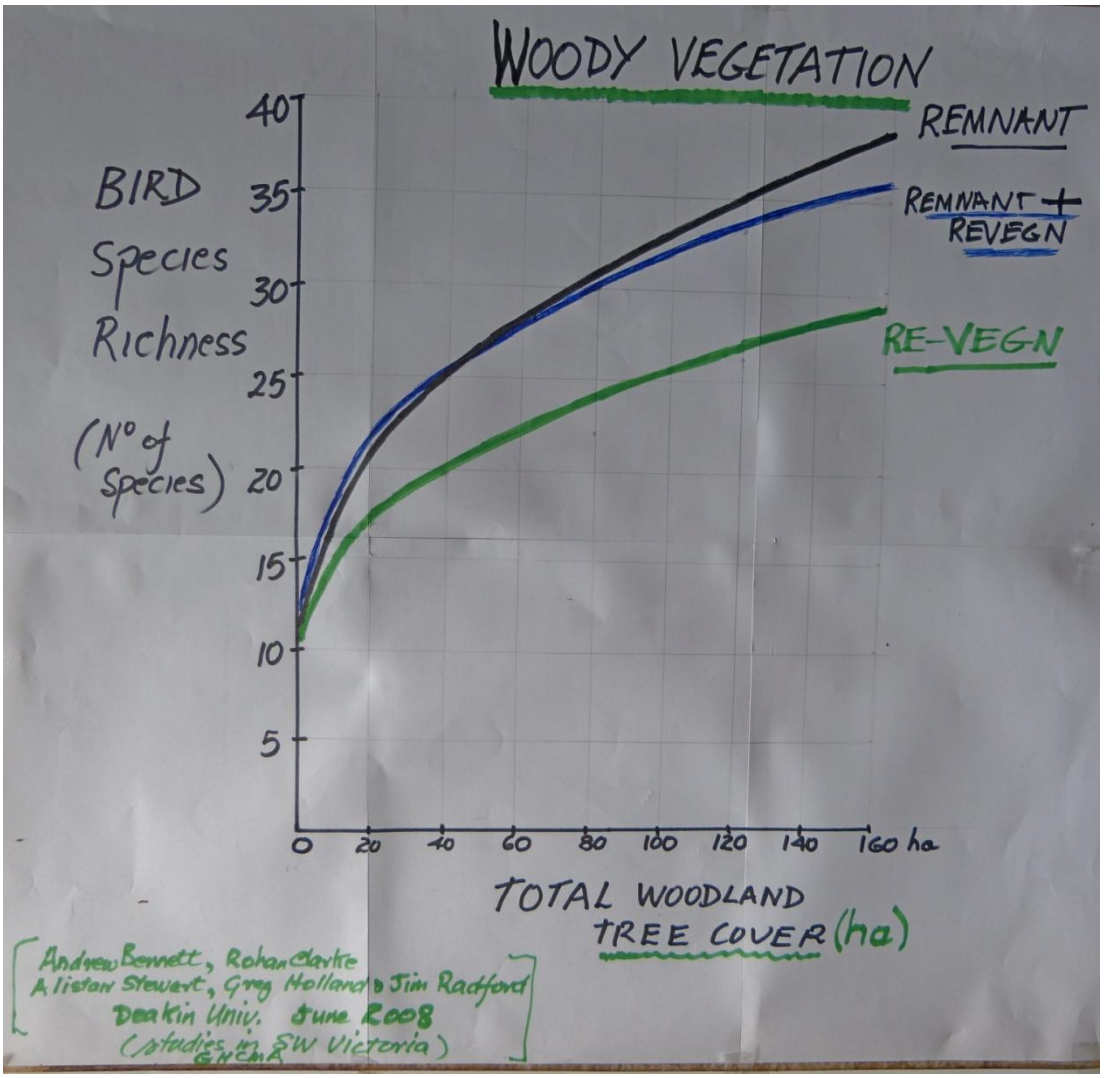
A bat story:
A farmer at Nhill sowed a crop of peas but, in a small area near a swamp that contained many dead trees, he did not spray for *Heliothis* moth control. The moths migrate to Victoria in August and September and the females fly over crops randomly laying eggs throughout. The farmer thought it was probably not worth the time and expense for the small area involved and expected the *Heliothis* to wipe out that part of the crop. He was surprised to find that it was not affected. Fabian Douglas, an entomologist and keen naturalist, conjectured that the explanation lay in the control of moths by the bats that lived in the dead trees in and around the swamp. Fabian thought that the moths were able to detect the bats sonar and kept away from that area – those that did not were eaten. Thus may bats exert a biological control on some problem insects in crops – and hence the need to retain the roosts that bats need.

APPENDICES
Copies of the roughly drawn figures used in the presentation, and a list of slides shown, are given in the following pages.


[RADFORD, MacRaild BENNETT DATA 2004 Northern Vic.
WOODLAND BIRDS
NUMBER of BIRD SPECIES
50
40
30
20
10
FARMLAND BIRDS
10
20
30
40
50
60
% LANDSCAPE TREE COVER


[Northern Victoria study Radford Bennett et al. 2004
Species Incidence
(average % presence on any day)
INCIDENCE of WOODLAND-DEPENDANT BIRDS
Species Differences
80
60
40
20
Grey Shrike-thrush
Crested Shrike-tit
Rufous Whistler
DUSKY WOODSWALLOW
White-browed Babbler
Eastern Yellow Robin
Yellow-tufted Honeyeater
10
20
30
40
50
% TREE COVER
("Incidence" ≡ index for population size)
{'Secure' if incidence is ≥ 75% of maximum expected
'Threatened' < 56% for that species.}


EFFECT of REVEGETATION on Birds
in a landscape with
Varying remnant vegetation.
BIRD SPECIES RICHNESS (N° of species)
35
30
25
20
15
10
5
Revegn %
15
10
5
2
0
0
2
4
6
8
10
REMNANT VEGn (% of Landscape)
* Re-vegn has most impact where little remnant vegn remains
* Re-vegn has some impact on bird species even where remnant vegn % is high.
Andrew Bennett, Rohan Clarke, Alistair Stewart, Greg Holland, Jim Radford
Deakin Univ. June 2008
GHCMA project in SW Vic


WOODY VEGETATION
BIRD Species Richness (N° of Species)
40
35
30
25
20
15
10
5
REMNANT
REMNANT + REVEGN
RE-VEGN
0
20
40
60
80
100
120
140
160 ha
TOTAL WOODLAND TREE COVER (ha)
Andrew Bennett, Rohan Clarke
Alistair Stewart, Greg Holland & Jim Radford
Deakin Univ. June 2008
(studies in SW Victoria)
GHCMA

Revegetation of farms & impacts on woodland birds and bats
Hamilton SGAP 8 Aug 2012

	Bats depend upon tree hollows & bark for roosts and paddock trees to collect insects
1	Greater Long-eared Bat (*N. gouldii*) – 292 from Mt Napier (see VNAT - Bird 1997)
2	Greater Long-eared Bat (*N. gouldii*) – 290 from Mt Napier (see VNAT - Bird 1997)
3	Lesser Long-eared Bat (*N. geoffroyii*) – 213 from Mt Napier (see VNAT - Bird 1997)
4	Lesser Long-eared Bat (*N. geoffroyii*) – 214 from Mt Napier (see VNAT - Bird 1997)
5	Gould's Wattled Bat (*C. gouldii*) – 217 from Mt Napier (see VNAT - Bird 1997)
6	Gould's Wattled Bat (*C. gouldii*) – 217a from Mt Napier (see VNAT - Bird 1997)
7	Gould's Chocolate Bat (*C. morio*) – 22 from Mt Napier (see VNAT - Bird 1997)
8	Gould's Chocolate Bat (*C. morio*)? – 223 from Mt Napier (see VNAT - Bird 1997)
9	Little Forest Bat (*E. vulturnis*)? – 298 from Mt Napier (see VNAT - Bird 1997)
10	Little Forest Bat (*E. vulturnis*) – 288 from Mt Napier (see VNAT - Bird 1997)
11	Little Forest Bat (*E. vulturnis*)? – 1987 from Mt Napier (see VNAT - Bird 1997)
12	Bentwing Bats in Byaduk Caves (Church), Apr1977
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16	Bat trap setup at Mt Napier, 1979 – 209
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22	Sugar Glider (*Petaurus breviceps*) at Dundas Range, 1980 – 346
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24	Sugar glider refuge stump at Mt Eccles Campsite No.12, 3Jul1994 – exit glider at 6.15 pm!
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26	Yellow-footed Antechinus (*A. flavipes*) at Dundas Ra, 1979 – 228
27	Brush-tailed Phascogale (Tuan) (*Phascogale tapoatafa*) cat-kill, Buckley Swamp, Sep1989 – 07
28	Feather-tailed Glider (*Acrobates pygmaeus*) cat-capture, Wannon Flora Res, June 1977 – 141
29	Fat-tailed Dunnart (*Sminthopsis crassicaudatus*) from a Strathkellar farm, 1979 – 187
30	Fat-tailed Dunnart (*Sminthopsis crassicaudatus*) from a Strathkellar farm, 1979 – 190
31	Brown Phasogale (*Antechinus agilis*), Mt Napier, 1979 (note hind foot clawless thumb) –133
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40	Common Boobook, Hamilton, April 1981 (I McCann photo)
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50	Giant old RRG at Dwyers Ck 300 m downstream from crossing, 16Oct2006 (4 m diam) -37
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55	Yellow Box & Yellow Gum Woodland, Claude Austen SF, Aug1976 – 598
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66	A diverse remnant (Swamp Gum, Blackwood, Cherry Ballart, Bursaria) near Heywood