

## Why monitor the woodland birds of the Mount Lofty Ranges?

### Introduction

Australian woodland birds are widely considered to be under serious threat (Olsen *et al.* 2005). The Mount Lofty Ranges (MLR) is an outlying island of woodland that has lost, and is expected to lose, a significant fraction of its avifauna (Ford & Howe 1980, Paton *et al.* 1994, Possingham & Field 2000, Black 2005). The Mount Lofty Ranges contain no endemic bird species. However, the MLR do contain some endemic subspecies and many isolated populations of species typical of wetter woodlands and forests (Schodde & Mason 1999). One of these, the Mount Lofty Ranges Spotted Quail-thrush may well have recently become extinct (last record 1984, not that anyone seems to have noticed).

Less than 20% of the original MLR vegetation remains – so the fate of its avifauna can be thought of as an indicator of the future fate of all of eastern Australia's woodland birds. If Azure Kingfishers and Spotted Quail-thrushes can disappear from the whole Mount Lofty Ranges, maybe they are also vulnerable elsewhere.

In 1999, funded by an Australian Research Council (ARC) Discovery grant, we began to monitor woodland birds in the Mount Lofty Ranges. Since then the project has been funded further by the ARC, the Department of Environment and Heritage (SA), The Nature Foundation (SA), The University of Queensland (UQ), the Adelaide & Mount Lofty Ranges Natural Resources Management (AMLR NRM) Board and the Birds for Biodiversity project (through the Conservation Council of SA). Further funds have been obtained through the NRM Board to continue the survey to 2010 – **but why?** *What is the point of monitoring anything?*

This article will try to answer that question, discuss some preliminary results of the work to date, and present some ideas about what we hope to achieve in the future.

A rough map of the 150 plus survey sites is shown in Figure 1 (squares represent gum woodland sites, triangles are sites dominated by stringy bark). Each site is 2ha and is surveyed for 20 minutes following the standard Birds Australia Atlas method. However we try to record exact numbers, as well as information on species heard or seen outside the 2ha, breeding in the patch or flying over.

### Why monitor the woodland birds of the Mount Lofty Ranges?

There has been considerable scepticism about the value of monitoring biodiversity. Some argue we should stop all the monitoring and simply take action. We believe that monitoring plays a variety of essential roles including:

1. The general public want to know how things they value, like birds, are faring. Indeed DEH has stated that they are committed to monitor regional trends and this survey is one of their few regional programs.
2. The Federal Government and co-investors in the National Heritage Trust (NHT, like DEH and the NRM boards) need to know if their on-ground actions are abating declines in biodiversity.
3. Monitoring can provide more formal evidence of declines of species that would otherwise rely on hearsay or expert opinion.
4. Evidence for a decline provides information to help determine the cause of the decline and the actions that are needed to abate that decline.
5. Monitoring across the whole MLR provides a platform for testing specific biodiversity recovery actions, like fox baiting or revegetation, in before-after control-impact experimental design.

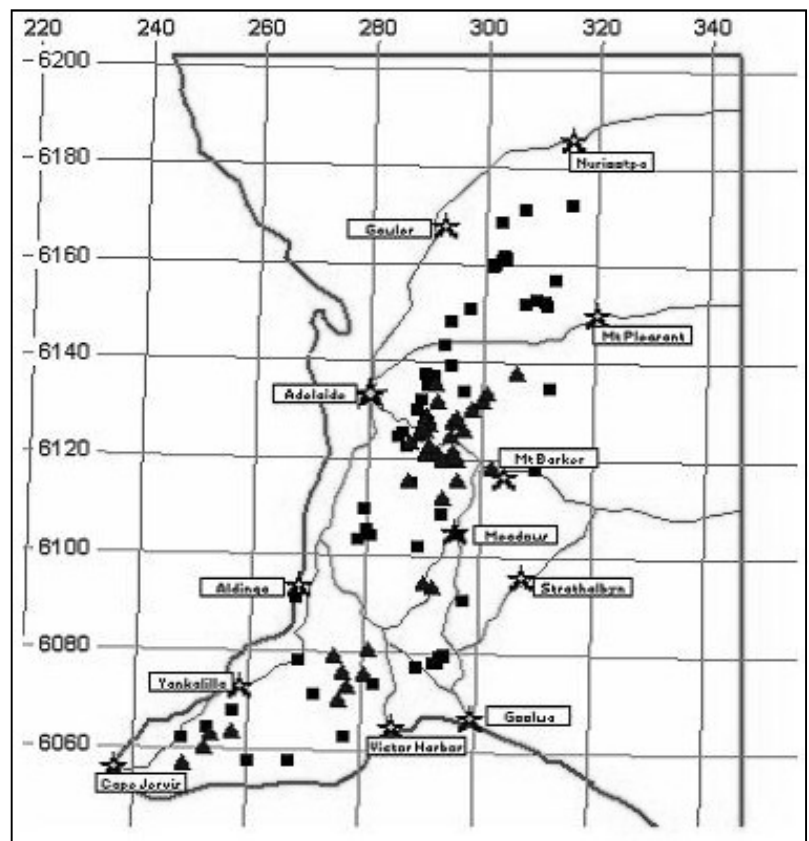
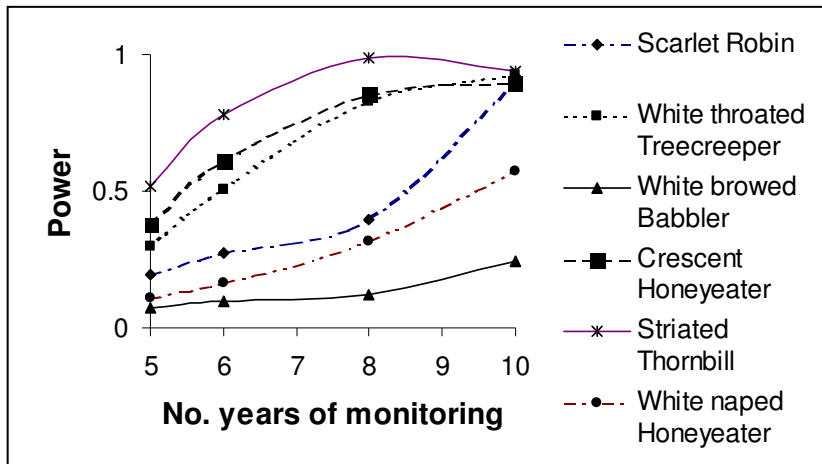


Figure 1. Some MLR Declining Woodland Bird Monitoring Sites.



**Figure 2.** Statistical power to detect a 30% change in conservation status of various species of woodland bird in the Mt Lofty Ranges, South Australia, as a function of the time spent monitoring. (Figure 3 in Field *et al.* 2007).

### What have we learnt so far?

We are unable to answer the really big question – how well are common birds in the Mount Lofty Ranges faring? Why? – because you generally cannot discern long-term trends in animal abundances with less than ten years of data. Figure 2 below from Field *et al.* (2007) illustrates this fact. It shows how many years of data we would need, given the current monitoring program of about 150 sites visited three times a year each, to separate a decline of 30% over a ten year period from the natural inter-annual variability (background noise due to the environment, variable observers, weather, etc.). This is a measure of the “statistical power” of the monitoring program. It measures our ability to pick up real changes of a particular size above and beyond natural fluctuations and measurement error. With seven years of data collated we are just getting to a point where significant changes, if they are occurring, should be discernable in common and moderately common species like the Crescent Honeyeater or Scarlet Robin. Picking up trends in uncommon species, like the White-browed Babbler, will take longer. This highlights the importance of keeping monitoring going for a long time. While pure research agencies like the Australian Research Council can be used to fund the start of projects like this – long-term commitments from government, regional bodies, non-government organisations and foundations are essential to regional monitoring success.

In the meantime the data has been useful for answering several more generic and fundamental questions about bird monitoring and monitoring in general. We have used the data to inspire the development of new statistical methods (Tyre *et al.* 2003, Martin *et al.* 2005, Field *et al.* 2005) and that work has already attracted numerous citations in the international literature (53, 14 and 12 citations to those

papers alone). This means the research is having a global impact on how we monitor biodiversity.

Early in the survey process we tried some variations on the monitoring method to see what was most cost-efficient for picking up changes and true absences of bird species from sites. Investing in fewer, long visits to sites has the problem of lack of replication. Lots of visits to a few sites mean that our results may not give a good picture across the whole region. We have found that 150 sites with three visits per site is a useful compromise, although there is room for expansion into specialised habitats and more disturbed habitats.

### The future

There are at least three broad areas where we hope to see more outcomes in the near future: detecting long-term changes, assessing the value of conservation management, and improving the theory and practice of bird monitoring generally.

The next three to five years may provide definite proof of significant changes in abundance and set a platform for determining the effect of landscape scale management. Providing evidence that our investment in biodiversity conservation is having an impact is absolutely essential for the long-term success of the NHT. This is one project that may be central to assembling that evidence since people who invest in things like to see returns. So, the Australian public do need credible evidence that their investment is delivering biodiversity outcomes, or otherwise (Field *et al.* 2007). As stated above, statistically significant trends are only likely to be detected after more than 10 years, so analyses of the data over the next few years will be crucial.

Now that we are on the way to have a solid understanding of natural fluctuations in bird densities in natural habitat across the Mount Lofty Ranges, we can use these data as benchmarks for assessing conservation actions – like revegetation, fox-baiting or weed control. For example, how does the bird community of revegetated sites compare with the bird community in natural sites? If we separate out sites that are, or will be, baited for foxes, can we see the impact of that treatment on the bird fauna? Indeed there are a myriad of projects that could build on this data, projects that would otherwise have no previous/control/baseline data, and hence have trouble picking up real impacts of conservation management from natural fluctuations.

## Why monitor the woodland birds of the Mount Lofty Ranges? cont.

We continue to use the data to explore more fundamental questions about bird surveying. For example, one of the postdoctoral fellows at UQ, Dr Judit Szabo, is using the data to ask the question – “How does systematically collected bird data differ from data collected as part of more ad hoc data sets like the Australian Bird Atlas?”

For more information about the project and details of the survey method (and a copy of all the data) see:

(<http://www.ecology.uq.edu.au/index.html?page=65812&pid=20910>).

### Thanks

Many people have contributed to this project so far — too many to list.

For the past three seasons, the survey was capably organised by Tina Bentz as an employee of the NCCSA.

Many paid and unpaid observers collected the data enduring early morning starts and frustrating weather.

Max Possingham has ensured the data is checked and curated, an essential but tedious task.

Tim Milne, Patrick O'Connor and the NCCSA staff and committee have been instrumental in keeping it alive during this critical phase.

I am particularly grateful to the NCCSA for managing this project and the generous support of the Department of Environment and Heritage (SA), The Nature Foundation (SA) and the Adelaide & Mount Lofty Ranges Natural Resources Management Board that enables it to continue into an exciting new phase.

And AEDA – The DEWR funded centre for Applied Environmental Decision Analysis covers analyses and web hosting of data ([www.aeda.com.au](http://www.aeda.com.au)).

A special thanks to landowners as continuity is of the essence for long-term monitoring programs such as this, so their ongoing help is greatly appreciated.

### References

- Black, A (2005) President's letter: The future of our birds. *Birds SA Newsletter* 196:3-4.
- Ford, H and Howe, R (1980) The future of birds in the Mount Lofty Ranges. *South Australian Ornithologist* 28:85-89.
- Olsen, P, Weston, M, Tzaros, C and Silcocks, A (2005) The state of Australia's birds 2005: woodland birds. *Supplement to Wingspan* 15:1-32.
- Paton DC, Carpenter G and Sinclair R (1994) A second bird atlas of the Adelaide Region. *South Australian Ornithologist* 31:151-264.

Possingham, HP and Field, SA (2000) Regional bird extinctions and their implications for vegetation clearance policy. *Lifelines* 7:15-16.

Schodde, R and Mason, IJ (1999) *The directory of Australian birds: passerines*. CSIRO, Collingwood, Victoria.

### Some publications using our MLR woodlands bird survey data

Field S, O'Connor, PJ, Tyre, AJ and Possingham, HP (2007) Making monitoring meaningful. *Austral Ecology* 32:485-491.

Field, SA, Tyre, AJ and Possingham, HP (2002) Estimating bird species richness: How should repeat surveys be organized in time? *Austral Ecology* 27:624-629.

Field, SA, Tyre, AJ and Possingham, HP (2005) Optimizing allocation of monitoring effort under economic and observational constraints. *Journal of Wildlife Management* 69:473-482.

Joseph LN, Field SA, Wilcox C, and Possingham, HP (2006) Presence-absence versus abundance data for monitoring threatened species. *Conservation Biology* 20:1679-1687.

Martin, TG, Wintle, BA, Rhodes, JR, Kuhnert, PM, Field, SA, Low-Choy, SJ, Tyre, AJ, and Possingham, HP (2005) Zero tolerance ecology: improving ecological inference by modelling the source of zero observations. *Ecology Letters* 8:1235-1246.

Possingham, HP, Field, SA, Possingham, ML and Tyre, AJ (2006) Monitoring woodland birds in the Mount Lofty Ranges. *Birds SA Newsletter February* 2006.

Possingham, ML, Field, SA and Possingham, HP (2004) Species richness and abundance of birds in Mt Lofty Ranges stringybark habitat: 1999-2000 survey. *South Australian Ornithologist* 34: 153-169.

Tyre AJ, Tenhumberg B, Field SA, Niejalke D, Parris K, and Possingham, HP (2003) Improving precision and reducing bias in biological surveys: Estimating false-negative error rates. *Ecological Applications* 13:1790-1801.

Westphal MI, Field SA, Possingham HP (2007) Optimizing landscape configuration: A case study of woodland birds in the Mount Lofty Ranges, South Australia. *Landscape and Urban Planning* 81:56-66.

Westphal MI, Field SA, Tyre AJ, Paton D, Possingham HP (2003) Effects of landscape pattern on bird species distribution in the Mt. Lofty Ranges, South Australia. *Landscape Ecology* 18:413-426.

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