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Citizen science data for the birds?

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Properly executed, ecological surveys can tell us a lot about a species. We can use this information to decide what to manage when, if our management approach is working, or if there is a need for policy reform. But systematic surveys of large areas by professional scientists are expensive.

Credit: © Dean Ingwersen/BirdLife Australia

In contrast, volunteer surveys are relatively cheap, and often the only source of available information. The important question then is: How reliable is information collected by citizen scientists?

Few studies have been undertaken to examine the question because there aren't many places where both a systematic and a volunteer survey have been conducted over the same timeframe at sufficient spatial scale. One place where this has happened, however, is the Mount Lofty Ranges in South Australia.

When we embarked on the comparison, we strongly suspected that volunteer-collected data that forms the basis of BirdLi BirdLife Australia's national atlas project would be highly biased. However, we were pleasantly surprised.

Covering an area of around half a million hectares, the Mount Lofty Ranges lie to the east of Adelaide. As a result of widespread clearing, only 10–18 per cent of its original native vegetation cover with understorey remains intact. As a consequence, it has lost a significant fraction of its birdlife, a trend expected to continue. The ranges contain some endemic subspecies and many isolated populations of species typical of wetter woodlands and forests further east.

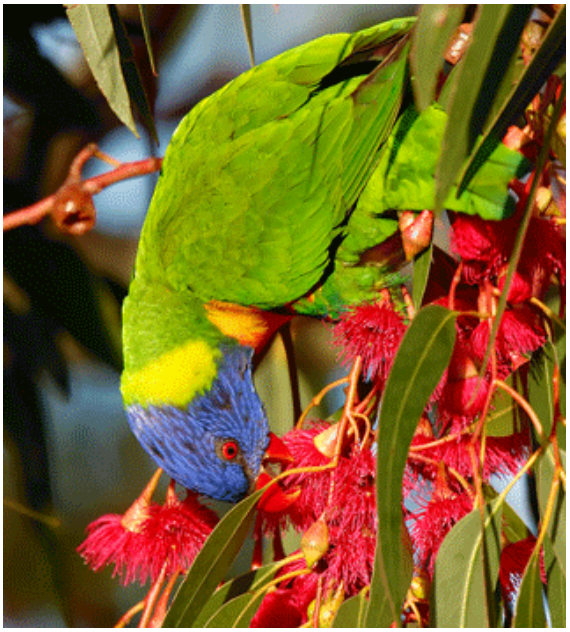
As Australian woodland birds are widely considered to be under serious threat, the Mount Lofty Ranges can be considered a harbinger of things to come for temperate woodlands of eastern Australia.[1]

Birdwatchers and ecologists have run a number of surveys in the Mount Lofty Ranges. The Nature Conservation Society of South Australia (NCSSA) in collaboration with the University of Queensland (UQ) has been running a

systematic survey there since 1998. The aim of the project was to detect changes in bird populations resulting from the clearance of native woodland. Ecologists also sought to better understand the population dynamics of species living in a fragmented system and the effectiveness of different habitat restoration initiatives. Surveys were focused on stringybark and gum woodlands.

Over the same time this 'planned' survey has been taking place, BirdLife Australia (formerly Birds Australia) has also been compiling volunteer-collected survey information from the Mount Lofty Ranges for its Atlas of Australian Birds project, one of BirdLife Australia's greatest resources. As with most other bird atlases being compiled around the world, it relies on data collected by volunteers using a standardised protocol. The Atlas has been running since 1998 and represents over 420,000 surveys across Australia, comprising over 10 million bird records collected by over 7000 atlassers.

Our aim was to compare data from the Mount Lofty Ranges from this national volunteer-based bird atlas program with data from the NCSSA/UQ survey. The BirdLife Australia survey was more extensive, in that data was collected from a much larger area of the ranges. The NCSSA/UQ survey, however, was more systematic – data was collected using a robust stratified sampling design.



Credit: © Glenn Ehmke

Both datasets have several thousand observations over nine years, collected using the same method: the standard 2-ha/20-minute survey technique used by Birdlife Australia (ie observers have two minutes to list all species detected in an area of two hectares).

The site selection protocol is the only major difference between the two datasets: volunteers were free to choose their sites and the time of their visit, while those surveying under the NCCSA.UQ protocol were instructed to go to particular sites at particular times.

Our aim was to see if the two datasets are telling us the same story about bird numbers in the Mount Lofty Ranges and if it is possible to 'calibrate' the ad-hoc Atlas survey using the systematically collected data.

We undertook our analysis expecting to find significant differences between data from 'professionals' and 'citizens'. To our surprise, the results were surprisingly close, and the small differences that were detected are readily explained.

For example, the best estimate for the number of chestnut-rumped hylacola (an endangered subspecies) was 294 and 273 from the two surveys, while for other species the numbers were also surprisingly close: white-naped honeyeater (15,620; 13,113), fan-tailed cuckoo(2008; 2012).

In a few cases the differences were substantial. For example, the BirdLife Australia data indicates almost three times as many brown treecreepers as the NCSSA/UQ data. This may be a sampling bias by volunteers to the few best remaining woodlands. And some species such as the horsefield's bronze-cuckoo and mistletoebird are best detected by calls not known to many birders. These species were less frequently recorded by the volunteers.

Credit: Simon Bennett/ AustralAvianImages (one-off use licence only)

Despite the differences, overall reporting rates from the two schemes were strongly correlated. The systematic surveys recorded more species that are routinely recorded by call, while the Atlas surveys recorded more species found within edge and open habitats.

The bottom line is that citizen science can work. Indeed, with appropriate calibration using selected regional surveys, volunteer collected and weakly structured atlas data can be used to generate robust occupancy and minimum population estimates for many species at a regional scale.

And that's what we did.[2] Using the NCSSA/UQ surveys to calibrate the BA survey data, we got one of the first regional estimates of the abundance of many bird species for any part of Australia!

So it's not really a question of citizen vs scientist so much as a proposition that science can add value and refine volunteer-collected information. That information can then be used to inform us about the true condition of our precious biodiversity.

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This week, 22-28 October, is National Bird Week. BirdLife Australia is hosting activities around the country - see website for details.

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A brown thornbill: in carrying out a survey, beware of LBBs or 'little brown birds' like weebill, rufous whistler, buff-rumped thornbill, which can escape detection unless you are able to recognise their calls.

If you're thinking of setting up your own survey...

Comparing the two Mount Lofty Range surveys led us to propose the following list of recommendations for anyone contemplating setting up their own survey.

- The survey program should have defined aims
- Surveys should be repeated in time and space using the same method
- Have strict guidelines and make observers follow them
- If possible train observers and check them against one another

Other things to pay attention to when doing systematic bird surveys:

- Incorporate random sampling. Avoid picking good birding sites, such as flowering trees, as preferential site selection can bias results.
- Stick to the protocol. Avoid recording 'show-offs' or 'exciting' species just outside the survey site or after/before the survey time as this could lead to these species (eg, parrots) being overestimated.
- Watch out for LBBs (little brown birds – small brown/cryptic birds, such as weebill, rufous whistler, buff-rumped thornbill). Due to identification problems or lack of experience with calls, these species can be underestimated.

More information on citizen science opportunities and tools can be found at the Atlas of Living Australia *(note this is a separate entity to the Atlas of Australian Birds).*

1 Szabo JK, PWJ Baxter, PA Vesk & HP Possingham (2011) Paying the extinction debt: woodland birds in the Mount Lofty Ranges, South Australia. *Emu* 111: 59-70.

2 Szabo JK, RA Fuller & HP Possingham (2012) A comparison of estimates of relative abundance from a weakly structured mass-participation bird atlas survey and a robustly designed monitoring scheme. *Ibis* 154: 468-479.

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