How many Common Mynas in the ACT?

By Martin Butterfield, Coordinator, Garden Bird Survey, Canberra Ornithologists Group Inc.

In brief, somewhere close to "a lot" and certainly "too many".   The remainder of this note will explain/rationalize the level of precision evident in that statement.

The range of possible numeric answers certainly includes 150,000.

The analysis which I have done in compiling this has led me to consider, for the first time, the process of estimating the absolute population size of birds, rather than an indicator or the relative population size, using data from the Garden Bird Survey (GBS).   I conclude this is a BAD THING for any species.

Genesis

On 16 June 2009 an article appeared in the Canberra Times reporting remarks made by the ACT Corrections Minister, John Hargreaves about Indian (*sic*) mynas[1]. It also cited, without clear attribution, an estimate of the population of this species in the ACT being as high as 150,000. The author of this note was intrigued as to how this number was estimated and posted a message to the COG chatline enquired about the provenance of the estimate.

One response to that posting, by Peter Ormay suggested that it may be based on work by Dr Chris Tidemann from ANU who estimated rates per km^2 for a number of suburbs. Later, Bill Handke, President of the Canberra Indian Myna Action Group, indicated[2] that it was based upon an estimate by Dr Tidemann of 250 birds/km^2 applied to the area of the Urban ACT of approximately 600 $km^{2.}$.   When making a presentation to COG in April 2006, Dr Tidemann[3] provided a value of 150 mynas per km^2, but this discrepancy (which probably arose due to a technology breakdown at the venue) will be ignored as the concept of estimating birds per km^2 and applying this to the area of the urban ACT[4] is seen as the important element of the estimates.

Thesis: that the number of Mynas in the ACT can be estimated from Garden Bird Survey data.

Given that the data collection unit of the Garden Bird Survey (GBS) is a site of 3Ha (0.03 square km) and the number of birds per site is provided, it should be possible to estimate the number of birds per square km. This could then be applied to the area of the Urban element of the ACT to estimate the number of Common Mynas.

A key statistic from the GBS is the measure of abundance designated 'A'.   It is the average number of birds seen per observer-week. Thus in an 'average week' with n observers in the panel over the year there would be n*A birds of that species seen. Noting that a square kilometre is equivalent to 100 hectares we can designate the area, in Hectares, of the ACT as 'H' and expand the number of birds seen within GBS sites in the ACT by a factor of H/3n to give an estimate of the number of mynas in the whole of the ACT.

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[1] More properly referred to as the Common Myna *Acridotheres tristis.*

[2] Email from Bill Handke on 23 June 2009

[3] Email from Chris Tidemann 23 June 2009

[4] An alternative estimator based upon the proportion of dwellings represented by the GBS sites is not appropriate since the object is to assess the number of birds in a physical area and the amount of land occupied by a dwelling is very variable.

Denoting the total number of birds in the ACT as M, that is: M = (A*n)*H/3n . Since the 'n' cancels out we have M = A*H/3.

For Year 25 of the GBS (3 July 2005 to 2 July 2006) the overall value of A provided in the COG Annual Bird Report was 4.9587: however this includes some sites in NSW[5]. Excluding sites in NSW the value of A for the ACT proper is 5.0852. Interestingly, this can be divided by 0.03 to give a value of birds per square kilometre of 169.5 – extremely close to the value of 150 calculated by Dr Tidemann from his transect studies of approximately the same vintage.

The next question is "what is the area of the urban part of the ACT?" While this might be thought of as a simple issue there are two major choices offered by the ABS. This could be seen as

- the area of Canberra Statistical Division, outlined in bold black in the LH image below equivalent to 808 km^2; or
- the Major Urban component of the ACT shown as brown in the RH image, equivalent to 297.7 km^2
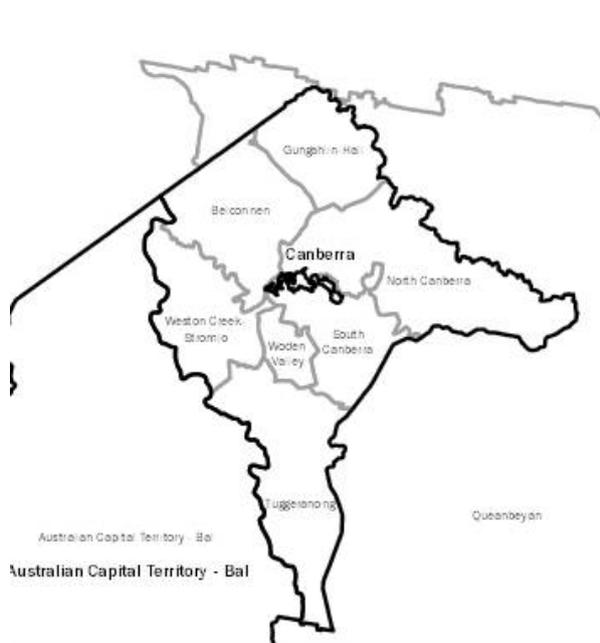
In terms of where mynas are to be found the first measure is probably too large, while the second is too small (noting the presence of the species in COG Woodland Bird Survey sites). Thus, for simplicity an arithmetic average of 550 km^2 (or 55,000 Ha) will be taken.

Bringing the two estimates together gives M =5.0852*55000/3 = 93,000. Note that this is an average: the words in the Canberra Times said '**as high as** 150,000' (emphasis added). I shall return to this point below.

Antithesis: that estimating the number of Mynas in the ACT is fraught with difficulties

In the development of the thesis above I attempted to avoid discussing the many alternatives that were possible. I was not totally successful in that objective as I considered various measures of the spatial size of the ACT. If one assumes that the observed abundance of mynas is applicable to the whole of the Canberra Statistical Division, the total number of mynas rises to 136,961!

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[5] Some of which, in urban Queanbeyan, reported mynas while others, in more rural areas, did not.

The value of A is of itself an average over a year, and the number of birds varies considerably over a year as a result of basic demographic processes. Looking over the entire 27 processed years of the GBS it is possible to create values equivalent to A for each week: I'll designate that A_w. Over a year the value of A_w varies from 1.72 in week 48, to 3.73 in week 9. The latter value is 33% above the average value of A over 27 years. Boosting the value of A by 33% (for 550 km^2) gives 123,000 birds, and applying it to 808 km^2 offers 182,000 birds!

Offering an extreme alternative, applying the adjustment factor for the lowest week (0.62 of the overall value of A_w) to the smallest 'official' area (297.7km^2) gives 5.0852*0.62*297.7/3 = 31,300.

A final comment on the area to be considered is to reflect that a posting on the chatline by Bob Rusk noted that the NSW city of Queanbeyan should not be disregarded in such an analysis. He commented that some parts of that city – particularly around the stables at the racecourse - provided a significant pool of birds to replace any control measures "over the border".

It should also be noted that the discussion here has only considered Year 25, the year of greatest abundance of mynas since CIMAG was formed. Further "interesting" issues would surely arise in any attempt to extend the analysis to other years.

Synthesis: the end justifies the means?

The discussion above shows that a very wide range of estimates of the number of mynas can be generated, depending upon the values of the two key variables, week of observation and area selected. These are summarised in the table below:

Estimate	Parameters	Number of birds
Minimum	Minimum value of A (3.15); ACT Major Urban Area	31,300
Average	Average value of A (5.08); Mean of Major Urban Area and Canberra Statistical Division	93,000
Maximum	Maximum value of A (6.76); Canberra Statistical Division	182,000

Of course, much of the variation can be attributed to the behaviour of the birds: numbers rise immediately after the breeding season (and, looking at the timing of the minimum, a case might be made for some birds leaving the GBS area for nest sites in the surrounding woodland during the egg laying to nest-leaving period). It is not considered that this variation is important, although it does suggest that it would be wise to avoid, where possible, presentation of estimates of the total number of Common Mynas[6] based upon GBS estimates. If it is necessary to give an estimate of overall population (for example to provide a 'big ticket item' for a journalist or politician) then the assumptions about the relationship of the estimate to the breeding population and the area for which the estimate is made should be specified.

In this case the estimate offered to the journalist is within the range shown in the table above. It is also evident that any of the estimates show that there are (too) many of the birds present in the ACT

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[6] Or any other species

This investigation has however reinforced the role of the GBS in providing indicative information (in this case the value of A) about the Common Mynas. Reference is made to the closeness of the population density obtained in this work and that developed by Dr Tidemann based on transect studies. Dr Tidemann has also shown[7] that the values of A and his transects correlate extremely well at the suburb level.   A good example of the indicative use of the GBS is also given in the Canberra Times article in stating that the species was 'the third most common bird species in Canberra, and last year they had dropped to 12th'.

29 June 2009

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[7] Email from Dr Tidemann.