

Conservation research leads to a paradigm shift in farming practice: a case study from the Western Australian wheatbelt

Denis A. Saunders

CSIRO Sustainable Ecosystems,
GPO 284, Canberra, ACT 2601
denis.saunders@csiro.au

ABSTRACT

This paper describes a project that produced an atlas of changes in the distribution and abundance of birds of the wheatbelt of Western Australia. The atlas was based on data collected by 187 community-based observers between 1987 and 1990. The atlas also contained data from annotated bird lists from 10 locations in the wheatbelt published before 1937. Comparisons between data from these two periods were used to assess changes.

The published atlas was reviewed in six journals. In this paper, these reviews are used to demonstrate differences in attitudes among scientists to the use of community-based observers to collect data to monitor change. One review was scathing of the use of such observers and the worth of the data collected by them. The other five reviews acknowledged the problems of using data from community-based observers, however, they also accepted the benefits of using volunteer observers. These benefits include: the ability to cover a large area with a sparse population; the self-education of those collecting the data; and the raising of a conservation force for change.

The paper presents a case for using volunteers to monitor change and illustrates how this process has led to changes in conservation practices in the wheatbelt of Western Australia.

Introduction

In 1984 CSIRO Wildlife and Ecology commenced a research program on the value of remnant vegetation to nature conservation in the extensively cleared wheatbelt of southwestern Australia. This program expanded until its focus was on landscape ecology and integrating conservation in production environments (Hobbs and Saunders 1993; Hobbs *et al.* 1993; Saunders *et al.* 1993). There were three objectives of the program; the first was to establish the scientific principles required for developing effective management of fragmented agricultural landscapes. The second was to communicate the research findings widely via seminars and other presentations to scientific and community groups, and via other methods, including scientific and popular publications, TV and radio. The third objective

was to use such communications to have the research findings incorporated into management by farmers, councils, and conservation management agencies.

My role, together with John Ingram and Perry de Rebeira, was to carry out research on the distribution, abundance (Saunders and Ingram 1995) and movement patterns (Saunders and de Rebeira 1991) of birds in the central wheatbelt around the shires of Kellerberrin, Trayning and Tammin (Figs 1 and 2). In this paper I present an account of some of this research and its impact. I then discuss the role of the community in that research and the importance of that involvement in raising the consciousness of conservation issues in the wheatbelt and in communicating the need for conservation to a wider audience.

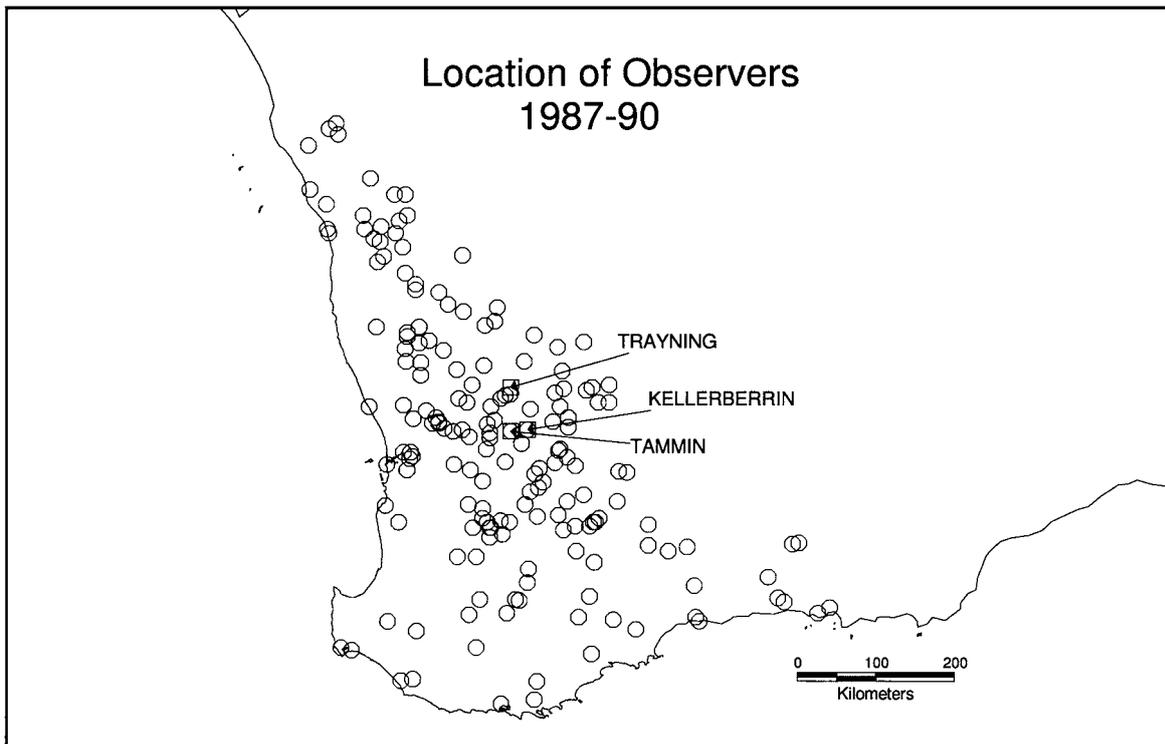


Figure 1. The southwest of Western Australia showing locations mentioned in the text and the locations of observers who collected data for the wheatbelt bird atlas.



Figure 2. An aerial photograph of Trayning Shire in the central wheatbelt of Western Australia. It illustrates the extensive clearing of native vegetation in the wheatbelt and the patchy distribution of remnants in the landscape.

The Checklist or Wheatbelt Bird Atlas Project

Methods: In 1987, John Ingram and I began a project aimed at establishing the distribution of birds in the central wheatbelt of Western Australia in an area roughly 50 km around the town of Kellerberrin (Fig. 1). We drew up a list of the birds that had been recorded in the area, or could reasonably be expected to occur in the area. This was based on the literature and our own records. This list was put into a small booklet that listed the species with a series of monthly columns each divided into four. This allowed observers to place a mark in the appropriate column if they saw or heard that species in that observation week. In May 1987, having produced the booklet, we called (via local radio and regional newspapers) for volunteers to collect data. The response was excellent; people rang or wrote from all over the Western Australian wheatbelt wanting to be enrolled as observers. Given the wide response, we broadened our coverage to include the entire Western Australian wheatbelt rather than the limited area around Kellerberrin. Over the period during which data were collected (1987-1990), 187 people provided data including some from the forested areas in the lower southwestern portion of the State, who also offered to participate (Fig. 1). These offers were accepted for two

reasons. The first was to encourage people to monitor the birds in their area. The second was to provide a comparison (albeit limited) between the birds of the wheatbelt and those of the higher rainfall areas.

Observers were asked to fill in their checklist by placing a mark each week against the bird species they recorded in their area. They were free to add comments on breeding or other items of interest. They also supplied a description of the area over which they collected data, provided a map where appropriate, and gave an account of the vegetation of the area. We were interested in presence/absence data and made no attempt to standardise the area over which each observer collected data; but we did ask them to nominate and stick with that area over the period they were collecting the data. In some cases it was their farm, in others a conservation reserve, residential areas and a school bus route. We also made no attempt to standardise the period spent looking for birds; just that observers record all species seen each week. One tick against a species could represent one individual seen once during the week to many seen every day. Observers ranged from people who were experts in bird identification to those who had limited knowledge. At the end of each year we sent out a new checklist and a stamped addressed envelope for the return of the completed checklist. Each completed checklist was photocopied, the data entered on a database, and the original returned to the observer.

A series of nine newsletters was produced between 1987 and 1990 and sent to each observer. These provided information on preliminary analyses of the data and highlighted issues of concern to observers. The newsletters were designed to provide feedback to the observers so they felt there was interest in the data they were collecting. In addition, observers were invited to visit our laboratory and see how their data were being used and discuss the atlas project with us.

Products of the research: The results of the atlas project have been published in refereed, international scientific journals (Saunders 1989; Saunders and Curry 1990; Saunders 1993) and in a book (Saunders and Ingram 1995) which was refereed by three people. Two were research ornithologists (one from CSIRO and one from a university) familiar with the avifauna of the wheatbelt. The third was an ornithologist who farmed in the central wheatbelt who had published an extensive paper on changes in the birds of his region (Masters and Milhinch 1974). Subsets of

the data were used in the first two papers listed and copies of the published papers were sent to each of the observers whose data were used. The third paper described the project and provided a summary, while the book presented the results in detail, compared the 1987-90 distributions of the avifauna with those prior to 1937, and concluded with a chapter on the conservation implications of the changes in distribution and abundance. It also provided information on actions to help conserve the avifauna. A copy of the third paper was sent to all observers while the book was made available to them on a subsidised basis.

Despite observers only recording if they saw a species each week, a crude measure of how plentiful a species was can be gauged by the percentage of recording time it was observed and the percentage of observers who recorded it. For example, if a species is recorded by more than 90% of observers for more than 90% of the total recording period, then it must be either very widely distributed, very common, very conspicuous, or all three. However, a species recorded by less than 10% of observers less than 10% of the total recording period must either have a limited range, be uncommon, or cryptic, or all three.

The results of the atlas project were compared with information on distribution and estimates of how plentiful species were prior to 1937, after which time the majority of land was cleared of native vegetation for agriculture. This information was derived from annotated bird lists from ten locations across the wheatbelt. Two data sets were presented in the atlas for comparison. The first was based on the percentage of observers recording each species and the percentage of the total recording period each species was recorded in the period 1987-1990. These figures were compared with the percentage of the ten annotated lists made prior to 1937 that listed each species and with the estimate of how abundant (rare, uncommon, common, very common) each species was stated to be by the authors of the lists. These numerical data were treated cautiously in analyses of changes in status. The second data set consisted of the distributions of each species based on the annotated lists prior to 1937 and the presence/absence data from observers 1987-1990. This data set was the more robust of the two. The comparisons pre-1937 and 1987-1990 showed that half of the 195 species (excluding vagrants) recorded from the wheatbelt had declined in range and/or abundance since broad scale clearing

for agriculture commenced after the Second World War. The data also revealed that birds dependent on native vegetation, particularly woodlands, were the most adversely affected by the loss or change in habitat.

Scientific reviews of the wheatbelt atlas: The response to the book was interesting and varied. Accounts were published in nine scientific or natural history journals. Three of these were summaries of the book, rather than reviews (*Biological Abstracts*, *Geo Abstracts*, *Ornithological Society of New Zealand*) and six were reviews. These reviews illustrate the differences in attitudes among scientists to the use of community-based observers to collect data on bird distributions. The first five reviews acknowledged the limitations of using community-based observers and commented on these limitations. However, they also stressed benefits that derive from using such observers. In presenting quotations from each review I have summarised the main critical and praiseworthy points made. In introducing each review, I have given a brief statement of the expertise of each reviewer as some of these reviewers may not be familiar to the readers of this paper.

The first review was by John Blyth (1995), a research scientist with the Western Australian Department of Conservation and Land Management. He is also an active ornithologist familiar with the avifauna of Western Australia. He noted:

“Denis Saunders is well known for his views on the importance of conservation biologists communicating their results to the general public and being part of the process for change which the results of their science suggest is necessary. Accordingly, the survey and the book are as much about trying to generate favourable actions for the conservation of birds and other wildlife as about documenting the circumstances which need changing... Like many biological atlas projects based upon input from the public, questions can be raised about the reliability of sightings and the thoroughness with which records are assessed. Verification of data is referred to, but further discussion of this point would have made a useful addition, and allowed a more critical judgement of the reliability of conclusions... Another potential problem (which the authors have obviously thought about) is the difficulty of comparing the modern survey with very sparse historical information to obtain realistic

estimates of change in abundance or distribution... The authors have attempted to overcome these problems in two ways. Firstly, by using whatever literature is available to confirm any conclusion drawn by comparison between historical and current information... Secondly, by considering the situation from ‘first principles’; that is, if a particular species is dependent upon a specific type of habitat and that habitat is reduced greatly in area it seems inevitable that the species will decline in abundance and distribution... As the authors intended, the atlas project has focused attention upon the issue of nature conservation in the wheatbelt and has resulted in a considerable increase in the number of people in local communities throughout the wheatbelt who are interested in birds and have some understanding of their ecological needs. These people will constitute a significant force for continuing change towards more sustainable farming methods... This book is likely to be the definitive reference on the status of birds in the agricultural areas of WA for many years.”

The second review was by Dick Schodde (1995) the Curator of CSIRO’s Australian National Wildlife Collection in Canberra and one of Australia’s leading avian taxonomists. Schodde wrote:

“Its strength is its seasonal and temporal maps of distribution. Building on a wealth of records coming out of CSIRO’s sponsorship of community involvement in bird recording, the authors have combed the historic literature to build a species-by-species picture of the changing distribution and status of birds in the Western Australian wheat-belt... there are two noteworthy shortcomings for ornithologists with an interstate perspective; one minor, the other major. The first is the title which is somewhat misleading because the book is really just about the birds of the Western Australian wheat-belt, and does not include species restricted to the wetter south-west corner... the second, and major shortcoming, is the inconsistent English nomenclature... these cavils apart, the book is clearly and readably printed and presented”

The third review was by Doug Robinson (1995), one of the Australia’s scientists pre-eminent in studies of changes in regional avifaunas. Robinson, who is based in Victoria, wrote:

“One of the strongest themes evident in the *Birds*

of *Southwestern Australia* is its parochialism, despite the fact that it encompasses 16 million hectares of land... An implicit aim of the atlas therefore has been to provide local residents with detailed information about the distribution, ecology and status of every bird species found in the wheatbelt... the authors go further and provide an excellent summary of the development history of the region, subsequent changes to the natural landscape (Chapter 2), and the conservation action needed to protect wheatbelt birds (Chapter 6)... In contrast with other regional atlases, then, *Birds of Southwestern Australia* is unabashedly conservationist in its approach – a bias that distinguishes it from previous atlases and clearly broadens its scope... All is not perfect, however... *Birds of Southwestern Australia* designates one page per species (Chapter 4), with the result that there is often more than half a page blank in cases where there is little to be said in the text about a species... Another difficulty I had with the presentation of data was the use of separate columns along the one axis to illustrate monthly reporting rates in different years – thus, three columns for January, three columns for February, and so forth... Finally, I wish that the authors had provided more detailed descriptions of the major vegetation communities mentioned throughout the book... These minor criticisms notwithstanding, *Birds of Southwestern Australia* provides an impressive addition to the set of regional atlases in Australia, and a template for future atlases in other regions. It has particular value as the most comprehensive document yet published in Australia on changes in the status or distribution of local birds, and I sincerely hope that it will be the catalyst for other such regional texts.”

The fourth review to appear was by Stephen Davies (1995), ex-President of the Royal Australasian Ornithologists Union, and one of the architects of the first national atlas of Australian birds (Blakers *et al.* 1984). Davies wrote:

“It is easy to raise criticisms of the methodology of the 1987-90 study – that no attempt was made to standardise the methods of searching, that species were treated as equivalent even though some were cryptic and some conspicuous, that all observers were not equally competent, that no method of analysis was employed that equalised the intensity with which different areas were covered – but the area covered was large and the human population sparse. The authors acknowledge

some of the shortcomings of the survey, but stress its overall value, as a snapshot in time, and I agree with them. It is far better than no record and provides a reasonable basis for comparison with the past.

I am less happy with the numerical data. It would be dangerous to use these data in isolation from the texts... The strength of the book lies in these reviews of the literature, drawing together diverse sources to provide a fragmented, but valuable, account of the changes in the distribution and abundance of birds... it is hard to see why so much space is given to listing the food items for most, but not all, species when the detail is not used. Another unsatisfactory aspect of the text is the descriptions of the sites of nests, especially for waterbirds... In many respects the species texts are useful précis of the birds’ biology, but the inconsistencies of treatment mean that they cannot replace other reference books for this purpose... The book would have made a real contribution to the assessment of the conservation status of the birds if it told us, even for the familiar species, how well populations are surviving over the twentieth century in nature reserves... despite some shortcomings this book will prove an interesting record of the distribution of many bird species in the wheatbelt between 1987 and 1990.”

The fifth review was by Yrjö Haila (1996), a Finnish ecologist and philosopher who wrote:

“Their data are interesting: they have collected all available bird watchers’ records from the region from the first part of the century up to 1937, and collected comparative data through what they call ‘community-based observer work’, that is, by volunteer observers each of whom kept bird records of a particular area in one or more years 1987 through 1990. These two data sets give estimates of the frequency with which different species have been recorded during these two periods. I think this is a good example of how data of uneven quality can be used for an intelligent comparison: the frequencies surely give an indication of changes in the regional bird fauna... Overall, the book demonstrates a way to make good use of old literature records and ‘community-based observer work’, and presents extremely valuable overall statistics. Mainly, however, it will be useful locally, hopefully by inspiring volunteers to go on collecting data that can document further changes in the wheatbelt avifauna.”

The last review to be published was by Ian Abbott, a scientist with the Western Australian Department of Conservation and Land Management (the agency responsible for nature conservation throughout Western Australia), and Ron Johnstone, the Assistant Curator of Birds at the Western Australian Museum (1997). This review is highly critical of the book and the use of “largely amateurs”, and scathing in its view of the usefulness of the work:

“In a small scientific community it is often difficult to offer constructive criticism without it being taken personally. Therefore, at the outset, we emphasize that the following critique is provided in the spirit of improving any subsequent edition... As could be expected from a database that depends on field observations of a largely amateur group, some records are suspect. Furthermore, the book is marred by lack of cognisance of important literature, an inadequate methodology, an ambivalent focus, and an over-reliance on data (often irrelevant) from outside Western Australia. For such accounts to be scientifically valuable there needs to be a vigorous sorting of field observations and close checking with known distributions and accounts... The book concludes with some practical advice as to how landholders in the wheatbelt can make a difference in conserving the local bird fauna.... Our overall conclusion is that the book is a useful record of the distribution, during the final four years of the ninth decade of the 20th century, of the easily recognizable and/or common bird species in the wheatbelt of Western Australia – eg: Emu, Pelican, Mountain Duck, Black Duck, Wedge-tailed Eagle, Malleefowl, Galah, Budgerigah, Rainbow Bee-eater, Black-faced Cuckoo-shrike, Willy Wagtail, Brown Honeyeater, Magpie Lark, and maybe Raven.”

Discussion of the implications of the reviews: It is interesting that Abbott and Johnstone (1997) began their review by pointing out the difficulty of offering constructive criticism without it being taken personally. They were implying that if the authors reply to their criticism it is only because the authors have taken the criticism personally; it is not to point out the destructive nature of the criticism and the consequences of the attitudes Abbott and Johnstone have expressed in presenting their review. They also point out their constructive criticism is offered in the spirit of improving any

subsequent edition. This is an exceptional statement as they would have to have been aware there will not be another edition of Saunders and Ingram (1995). Any subsequent atlas will be based on a new data set collected specifically for that purpose.

It is also interesting to see how the different reviewers refer to the observers who collected the data on which the wheatbelt atlas is based. Blyth referred to “input from the public”; Schodde referred to “community involvement; Davies noted that “all observers were not equally competent” and Haila used the term “volunteer observers.” On the other hand Abbott and Johnstone referred to the “largely amateur group” implying that the observers are less worthy of collecting data than professionals. This attitude towards amateurs is extraordinary in that they published their review in the journal of a natural history society made up mainly of amateurs. They then build on the lack of credibility associated with data collected by amateurs by vigorously attacking the scientific credibility of authors of the study and the book. This they do by stating “the book is marred by lack of cognisance of important literature, an inadequate methodology, an ambivalent focus, and an over-reliance on data (often irrelevant) from outside Western Australia.”

Basically, Abbott and Johnstone believe that this analysis of the distribution and abundance of birds of the wheatbelt based on the observations of “largely amateurs” is useful for only 13 and possibly 14 species. This is less than 10% of the avifauna recorded from the region. Their dismissive statements make little reference to the conservation value of the results, the educative impact of involvement in collecting data, or the potential source of converts to conservation as raised by Blyth. Their review is scathing in its dismissal of data collected by amateurs and may fuel the resentment of amateurs. Their lack of acknowledgement of the benefit of involving the community is extraordinary considering that Abbott is a member of the government agency charged with nature conservation in Western Australia; without active involvement of the community in conservation, the agency’s charter will be impossible to carry out successfully. Bluntly, Abbott and Johnstone missed the point of the book.

As stated by Blyth (1995) “the survey and the book are as much about trying to generate favourable actions for the conservation of birds and other wildlife as about documenting the

circumstances which need changing... the atlas project has focused attention upon the issue of nature conservation in the wheatbelt and has resulted in a considerable increase in the number of people in local communities throughout the wheatbelt who are interested in birds and have some understanding of their ecological needs. These people will constitute a significant force for continuing change towards more sustainable farming methods.”

I shall expand on these issues. However, this can only be done by anecdote as I am not able to quantify the educative value of community-based observer work or the opportunities education provides to initiate conservation action.

If one is going to become involved in community research one can take several approaches. One approach is to make the experimental collection of data so scientifically rigorous that it puts off the volunteers who are required to collect the data. I had experience of this in that one of the observers who collected data for the wheatbelt atlas was a person who has probably forgotten more about birds than I will ever learn. He told me he would not collect data for the Australian Bird Count conducted by Birds Australia because they were asking him to collect data in a way he thinks asks too much of him. Yet this observer had kept detailed observations of the birds of his property over decades, had written a scientific paper on the subject (Masters and Milhinch 1974) and, as a result of his working with me, was putting all of his observations into a book so they would be available for others.

Another approach is the one taken in our wheatbelt atlas, where volunteers were encouraged to collect presence/absence data over an area with which they were familiar. Despite not knowing each of the volunteers who took part nor knowing how good a bird watcher they were, I argue that the findings from the atlas project are sufficiently reliable to say we were recording data indicating major changes in the avifauna and that those changes have been documented convincingly. In fact, five out of six reviewers were convinced by this approach. In addition, because the work has been carried out and published, the exercise will be repeated within the next 25 years.

Non-quantifiable results of the research: One of the most valuable outcomes of the atlas project is the self-education of many of the volunteers and the importance of building up a committed

cadre of people who have helped document change. I illustrate this with several examples.

After we started to enrol volunteers in mid-1987, one woman rang and said that, while she didn't know very much about birds, she would really like to help. After going through a list of birds it was obvious she could name many in her district in the central wheatbelt and she agreed to record what she saw. In December 1987 she returned her first completed checklist and in a covering letter she wrote: “I am really enjoying keeping a checklist. I've seen birds which I've never seen before though I thought I was reasonably observant. A little discipline does wonders.”

She rang me about six months later and told me she had the Grey Shrike-thrush (*Colluricincla harmonica*) in her garden. She thought they were really wonderful because they came onto her verandah where they fed on spiders and insects. We then had a conversation which was conducted along the following lines. She said “it's really great fun seeing them.” I said, “Well, that's very interesting.” She said, “Yes, they're a lovely bird but I have a problem.” I said, “What's the problem.” She said, “My husband is going to spray.” I said, “What's he going to spray for?” She said, “He's going to spray the farm for insect pests. I'm just trying to find out from you what's going to happen to the Grey Shrike-thrush.” I said, “You tell me what's going to happen to the Grey Shrike-thrush. What does it eat?” She said, “Insects.” I said, “What's going to happen to the Grey Shrike-thrush?” She said, “I don't think my husband is going to spray.”

In January 1991 she sent in her last checklist and wrote, “Herewith my checklist for 1990. I feel quite sad to be returning my last list. I have really enjoyed collecting the information and have learnt so much from your newsletters as well as my own observations. I must have gone around with my eyes shut. That is a rather startling revelation as I thought I was quite observant.”

In 1993 I published a summary paper about the atlas project (Saunders 1993). On the copy I sent to her I wrote “Dear ..., we are going to publish this material in a book. I'll keep you informed. We will have a book launch and I'd love to meet you.” Late in 1993 I received a letter from her husband in which he wrote, “I'm not too sure how to state this. My wife was one of your observers... I've just come across a circular from you with a little note written in the corner regarding publication. She was operated on in January... for cancer... but she died

on ... August. Your project gave her great pleasure and I thank you for it." I was fortunate enough to meet her husband subsequently and during our discussion he told me that they had altered some of their farming practices because she had watched birds, and that she watched birds basically because she was helping with the wheatbelt atlas.

I have recounted this story because it illustrates two points eloquently. The first is the power of self-education. The second is the use of the knowledge gained to influence management practices. These points were ignored by Abbott and Johnstone, but they were a major result of the wheatbelt atlas, as discussed by Blyth.

My involvement with volunteers provided many opportunities to talk to landcare and other farming groups throughout the wheatbelt and also in the city. I would frequently be contacted by people organising field days, workshops or seminars. Before I left Western Australia in June 1997, I was speaking at at least 20 such venues a year. This network has led to similar opportunities over the eastern side of the continent and I am taking part in as many as I was in Western Australia. The symposium organised by the Royal Zoological Society of New South Wales on which this volume is based is an example. These sorts of opportunities have valuable consequences and I give another example of the flow-on effects.

A couple who farmed in the northern wheatbelt of Western Australia enrolled as observers after reading an article about the project in *The Countryman*, a rural newspaper. They kept meticulous records and provided many detailed notes of their sightings. They continue to maintain the same detailed records and monitor elements of the avifauna on their property.

They asked me to speak to their local wildflower group and subsequently I had a number of contacts with Alison and John and learnt more about their farming methods. I persuaded Alison to attend an international conference and present a paper about their farming methods (Doley 1995). In addition, I was able to pass on information about the ecology and conservation of Carnaby's Cockatoo *Calyptorhynchus latirostris*, a species of black cockatoo that has undergone a massive decline as a result of clearing of native vegetation and the invasion of its range by the Galah *Cacatua roseicapilla* (Saunders 1990). The Doleys have Carnaby's Cockatoo breeding on their property as well as the Red-tailed Black Cockatoo *Calyptorhynchus magnificus*, the Major

Mitchell *Cacatua leadbeateri*, two species of Corella and the Galah. The Galah and the Corellas have invaded the area and have increased to large numbers. These species are competing with the black cockatoos for nest hollows and the Galah is smashing their eggs. In addition, the Galah is damaging the trees it nests in; in some cases ringbarking them so they die subsequently.

As part of their farm management, the Doleys have been reducing the numbers of Corellas and Galahs that go anywhere near a hollow in which a black cockatoo was nesting. They have been monitoring the Carnaby's Cockatoo population and its breeding success has risen quite markedly since they started controlling the other cockatoos. The Doleys and the Waddi Forest Landcare group, of which they are members, have now linked with a Perth school group that grows *kwongan* (sandplain heath) species on which Carnaby's Cockatoo is known to feed and they are planting them on farmland around the Doley's district to provide more feeding habitat for the birds.

The Doleys are a fine example of what farmers can achieve for conservation and they acknowledge that many of their changed practices were the result of what they learned from taking part in the atlas project. Writing of their involvement in the project, Alison noted (Doley 1995) "We enrolled and I quickly realized how little I knew about the local birds and their movements. Denis exemplifies the belief that where practical, scientists in his field should spend up to 10% of their time explaining and involving the public in their work. Our wildflower group has benefitted from this philosophy."

These are a few examples of the importance of involving the community in research for conservation. While there may be some disadvantages that result in loss of scientific rigour, these are outweighed by the benefits that flow from the interaction of members of the community with science. I believe we should not lose sight of these benefits. Nor should we miss any opportunity to try to build on the networks that result from these interactions because we do not know how productive they may be for conservation in future. Without the active involvement of the community in all aspects of conservation the environment will continue to be discounted and degraded.

Acknowledgements

I am grateful to the many members of the community with whom I have worked on conservation issues over the past 30 years. I would like to name all of them here, however, it would take up far more space than the editor will allow me, but more importantly, it would embarrass many of them to be named in this way. I am also grateful to: Dan Lunney who invited me to present

these ideas at the Royal Zoological Society of New South Wales forum “Community and research-based conservation: a clash of paradigms”; John Ingram who put an enormous amount of effort into the atlas project and prepared Figure 1; and Sue Briggs, Jane Gilmour, Dan Lunney and Harry Recher who provided constructive criticism on an earlier version of this paper.

References

- Abbott, I. and Johnstone, R. 1997.** Review: Birds of Southwestern Australia: an Atlas of Changes in the Distribution and Abundance of the Wheatbelt Avifauna. *West. Aust. Nat.* **21**: 209-211.
- Blakers, M., Davies, S. J. J. F. and Reilly, P. N. 1984.** *The Atlas of Australian Birds*. Melbourne University Press, Melbourne.
- Blyth, J. 1995.** Book review: Birds of Southwestern Australia: an Atlas of Changes in the Distribution and Abundance of the Wheatbelt Fauna. *Western Australian Bird Notes* **75**: 5-6.
- Davies, S. J. J. F. 1995.** Review: Birds of Southwestern Australia: an Atlas of Changes in the Distribution and Abundance of the Wheatbelt Fauna. *Emu* **95**: 303-304.
- Doley, A. 1995.** Networks needed by individual farmers: a personal perspective from the northern wheatbelt of Western Australia. Pp. 241-250 in *Nature Conservation 4: the Role of Networks* ed by D. A. Saunders, J. L. Craig and E. M. Mattiske. Surrey Beatty & Sons, Chipping Norton, NSW.
- Haila, Y. 1996.** Western Australian Wheatbelt – a Showcase of Habitat Fragmentation. *Omis Fennica* **73**: 188.
- Hobbs, R. J. and Saunders, D. A. 1993 (Editors).** *Reintegrating Fragmented Landscapes: Towards Sustainable Production and Nature Conservation*. Springer-Verlag, New York.
- Hobbs, R. J., Saunders, D. A. and Arnold, G. W. 1993.** Integrated landscape ecology: a Western Australian perspective. *Biol. Conserv.* **64**: 231-38.
- Masters, J. R. and Milhinch, A. L. 1974.** Birds of the Shire of Northam, about 100 km east of Perth, WA. *Emu* **74**: 228-244.
- Robinson, D. 1995.** Review: Birds of Southwestern Australia: an Atlas of Changes in the Distribution and Abundance of the Wheatbelt Fauna. *Australian Bird Watcher* **16**: 171-172.
- Saunders, D. A. 1989.** Changes in the avifauna of a region, district, and remnant as a result of fragmentation of native vegetation: the wheatbelt of Western Australia. A case study. *Biol. Conserv.* **50**: 99-135.
- Saunders, D. A. 1990.** Problems of survival in an extensively cultivated landscape: the case of Carnaby's Cockatoo *Calyptorhynchus funereus latirostris*. *Biol. Conserv.* **54**: 111-24.
- Saunders, D. A. 1993.** A community-based observer scheme to assess avian responses to habitat reduction and fragmentation in south-western Australia. *Biol. Conserv.* **64**: 203-18.
- Saunders, D. A. and Curry, P. J. 1990.** The impact of agricultural and pastoral industries on birds in the southern half of Western Australia-past, present and future. *Proceedings of the Ecological Society of Australia* **16**: 303-21.
- Saunders, D. A. and de Rebeira, C. P. 1991.** Values of corridors to avian populations in a fragmented landscape. Pp. 221-40 in *Nature Conservation 2: the Role of Corridors* ed by D. A. Saunders and R. J. Hobbs, Surrey Beatty & Sons, Chipping Norton, NSW.
- Saunders, D. A., Hobbs, R. J. and Arnold, G. W. 1993.** The Kellerberrin project on fragmented landscapes: a review of current information. *Biol. Conserv.* **64**: 185-92.
- Saunders, D. A. and Ingram, J. A. 1995.** *Birds of Southwestern Australia. An Atlas of Changes in Distribution and Abundance of the Wheatbelt Avifauna*. Surrey Beatty & Sons, Chipping Norton, NSW.
- Schodde, R. 1995.** Review: Birds of Southwestern Australia: an Atlas of Changes in the Distribution and Abundance of the Wheatbelt Avifauna. *Canberra Bird Notes* **20**: 99-100.

MARTIN DENNY: Denis, should we always act as God? Why can't the Corellas and Galahs take over?

DENIS SAUNDERS: I think it's an extremely good question. Possibly they can, but we also get rid of feral animals. Are you going to say, "Well, we should let the Fox run loose", because in fact the Galah and Corellas have both invaded that particular area of the wheatbelt as a result of our land use patterns. The farmers who control them happen to believe, and I agree with them, that we need to manage the fauna.

If you look around the Western District, or any area where you see Galahs, have a close look at a Galah nest tree and you will often see that there is a scar. They peel the bark off trees. They only do it to their nest tree, and in extreme cases they actually ringbark the tree. The Salmon Gum in most of the wheatbelt is now beginning to be a threatened species. Galahs are actually ringbarking them. I say that's a management issue and we should - what is the term - "play God".

I think we have to make value judgments somewhere along the line, Martin. I will give you another case in point. The Brown Honeyeater is a nectar feeder in the Western Australian wheatbelt. Farmers could say: "What does it matter if we lose a species like the Brown Honeyeater? Should we play God?" The Brown Honeyeater is one of the last remaining native animals in the wheatbelt that pollinates plants. If we lose this honeyeater, we've lost an element of ecosystem function. Do we play God and try and maintain it or do we say: "To hell with it. Let's just see that landscape fixed in all time until those living dead die"? They are value judgments we have to make.

CLIVE BARKER: This discussion has just brought to mind that we've played God already. There is hardly any woodland left. I think that was playing God more than the desire to control Galahs.

DENIS SAUNDERS: I agree with that. My wife and I were at a public meeting recently and there were people saying we should get all the farmers off the land, mainly because of the blame associated with the changes, particularly the loss of native vegetation. This is a ridiculous attitude. Farmers might be part of the problem, but they're the major part of the solution and we should be looking closely at working with them to get that solution.

There is a swag of changes taking place. What we have to do is work out whether we're going to accept those changes. There's a community in the Gnowangerup area in Western Australia that has decided they like the old mallee chook and that the bird has symbolism to them because "gnow" is the Nyoongah name for Mallee Fowl. As a result they are trying to manage the land to retain the species. If they go to the state conservation agency and say, "Give us some resources because we want to conserve the Mallee Fowl in our area", the response will be, "We can't spare any resources for you because it's not endangered over its entire range." So this agency is playing God and the communities are saying, "Hang on a minute. We want to preserve an essential element of our locality. We need the information to do it." These are the sorts of decisions that we all have to come to terms with, so it has to be the local communities that are making those decisions too.