Monitoring Malleefowl: Options, problems and solutions

Joe Benshemesh
(joe.benshemesh@nt.gov.au)

Dedication: to the late Angus Torpey who was one of the pioneers in monitoring Malleefowl in Victoria and in Australia, and to Keith Hately, Max Downes and the Mid Murray Field Nats who did likewise. Angus kept a close watch on "his" birds and freely guided countless numbers of people, especially kids, out to the wilds of Wathe to educate them in the ways of Malleefowl, and to spin a good yarn or two.

Introduction

People who have seen Malleefowl in the wild may be a little surprised to hear that Malleefowl are actually an elusive and cryptic species that is particularly good at being unseen and disappearing. In fact, when you do see Malleefowl in the wild it is usually because you've stumbled onto an individual that is not too frightened of people and tolerates your presence. You generally never see the wary birds.
The cryptic nature of Malleefowl, coupled with their low densities and solitary (or paired) habits, presents a challenge for scientists and managers wanting to measure Malleefowl numbers across the landscape (survey) or through time (monitoring). Here, I will briefly discuss the options available and the various pitfalls, and provide an example of a successful monitoring project by a community group in Victoria.

Why Monitor?

Malleefowl have declined substantially in distribution and abundance since Europeans settled the Australia, and are now considered to be threatened wherever they still occur. This decline has been due to various causes and is expected to continue unless management of Malleefowl habitats and populations is improved. Monitoring involves tracking Malleefowl numbers in time in order to measure changes in populations. This is essential information for conservation planning and provides opportunities for targeting management that may benefit Malleefowl where it is most needed. Perhaps even more importantly, monitoring provides a means of measuring the effectiveness of management actions (eg. fox control, fire, etc), thereby providing a feedback loop so that we can continue to improve management and benefit Malleefowl.
In short, monitoring provides us with a finger on the pulse of Malleefowl populations, without which we are blind to the trends in Malleefowl numbers and the effectiveness of various management actions.

How? Monitoring options

Monitoring Malleefowl involves obtaining reliable and repeatable measures of the number of birds about so that changes can be detected. The term 'monitoring' is also sometimes applied to more detailed measurement of, say, egg production and survival, or individual longevity and recruitment of Malleefowl. However, I will use the term monitoring specifically to refer to measuring population abundance changes in time. There are basically three ways to do this without disturbing Malleefowl: counting individuals (sightings) or their signs (tracking), or counting their nesting mounds. I will discuss each of these measures in turn.

1. Sightings:unwanted biases

Most bird survey and monitoring is conducting by counting individuals in set areas for a set amount of time. While this works well for many species, especially conspicuous species, it is not a good method for monitoring Malleefowl because the birds are generally too elusive and because resident birds are not readily distinguished from those travelling through an area. The elusiveness of Malleefowl means that sightings are rare and sensitive to the immediate habitat, the tolerance of the individual bird/s to people, and chance. Thus, it is typical for the number of sightings of Malleefowl at a site to vary enormously from day to day, even in the very best areas. This low repeatability of sightings makes any statement about the actual number of birds in an area very difficult. Worse still, sightings don't provide information on whether a bird is resident or not, and this can lead to misinterpretation. For example, more Malleefowl are usually sighted during droughts and after fires because the birds have been forced out of their sheltered habitats and are searching for food. It would be misguided to conclude that the populations were doing well because there had been an increase in sightings. These birds are refugees, but can't be readily be distinguished by sight from resident birds. Likewise, Malleefowl occasionally disperse and settle in inappropriate habitats where they are sighted, although it is most unlikely that the habitat would support breeding birds. Such 'loopy locations' have been recorded wet forests and riparian woodlands where the habitats are clearly unsuitable for breeding, but sightings in less obviously inappropriate habitats may go unquestioned and lead to unsound data and conclusions.

While sightings do not provide an ideal index of Malleefowl abundance for monitoring, sightings do provide a useful basis for determining the distribution of the species. In particular, incidental sightings by birdwatchers and local communities provide a valuable means of identifying dispersal routes across agricultural landscapes. For example, occasional sightings of Malleefowl along roadside vegetation strips suggest that these may be crucial in linking Malleefowl populations in otherwise isolated reserves.

2. Tracks: traditional methodology

Observing the footprints made by Malleefowl, or 'tracking', is the oldest means of detecting Malleefowl in an area and is still used to great effect by Aborigines in the Anangu-Pitjantjatjara Lands of SA and other remote areas of central Australia. Malleefowl have very distinctive feet and travel mostly on foot, so on suitable substrates the ground betrays their presence much more efficiently than any other

method. Well-structured tracking can provide better information than sightings because the cryptic nature of the birds is less of an issue, and because their tracks also show whether a bird is resident, and whether it has a mate or is solitary. Moreover, the breeding mound can usually be found relatively easily by following footprints. However, tracking requires a suitable open ground cover with some loose sand and this is usually found only in arid regions such as in Central Australia. In these areas, breeding densities are typically extremely low and tracking is the only means available to monitor Malleefowl numbers.

3. Nests/Mounds: family censuses

Most Malleefowl monitoring programs involve counting or estimating the breeding density of the birds in set areas, thus providing an estimate of the breeding density in the area. This is by far the best indicator of population because these birds are reproducing and are clearly not refugees or dispersers, and because the estimate is linked to a very specific area on the ground. Monitoring is conducted either by visiting known mounds on the ground or by helicopter and determining how many are used for breeding, or by flying transects and counting all the active mounds flown over. Aerial surveys of this type are really only suitable in relatively open habitats because detection becomes unreliable where there is much overhead cover and shadow.

By far the simplest and most reliable monitoring data is collected on the ground by visiting mounds. This requires a thorough search of the site first and routinely every few years, but between these labour intensive searches monitoring can be achieved at relatively low cost by visiting and describing all the known mounds in the area. Malleefowl tend to renovate old mounds rather than start new ones 'from scratch', so revisiting all the known mounds provides a good estimate of the number of breeding pairs resident and reproducing in an area. This method of monitoring is also well suited to community involvement, although reasonable densities (>0.5 pairs/km^2) are required to make the initial search effort worthwhile.

It is desirable to collect estimates of breeding density every year for a host of reasons, but it is not essential. A monitoring site provides two valuable contributions for Malleefowl conservation. The first is that the breeding density that is initially observed will forever be the benchmark with which all subsequent estimates of breeding density can be compared. This is an enormously valuable statement about the specific patch of habitat at one time in the past. The second contribution is the routine monitoring data which provides information on current population trends.

Victorian experience

Measurement of Malleefowl breeding densities started in the 1960s, often by local communities wanting to demonstrate the value of reserving remnant patches of habitat. Angus Torpey used his family to search parts of Wathe, Keith Hately searched Kiata, the Mid Murray Field naturalists searched Wandown and the Wychitella Forest Preservation League searched Wychitella near Wedderburn. Also at this time, Max Downes of the Department of Fisheries and Wildlife organised some surveys in larger patches of mallee in NW Victoria, but unfortunately this information seems to have been lost. In 1987 and 1989 I revisited some of these sites in NW Victoria with a group of international conservation volunteers (Operation Raleigh) with the view of determining breeding densities for habitat research and for ongoing

monitoring. Since then the monitoring system has grown steadily with support from Parks Victoria and its predecessors in terms of the number of sites monitored, and also in terms of the organisation, sophistication and efficiency of the monitoring system. Currently, 24 sites and about 900 mounds are monitored each year by a small band of volunteers from the Victorian Malleefowl Recovery Group.

Cost$$

In Victoria, Parks Victoria and its predecessors have funded the Malleefowl monitoring program since 1991 and this has ensured both continuity of data and allowed the program to evolve. While Parks Victoria's predecessor originally tried to conduct the monitoring with its staff, field costs were prohibitively high due, in part, to the difficulty of re-locating mounds. Since then, the monitoring has been conducted by consultants (Paul Burton and I) and increasingly by community volunteers. The monitoring systems have also been improved enormously and is now entirely run by volunteers who organise and conduct the field work and submit the data electronically for storage in purpose built databases.

The monetary cost of the monitoring has fallen dramatically over this timeframe (figure 1) and currently three times as many mounds are monitored for less than a quarter the total cost incurred in the early 1990s. Moreover, data quality has also improved enormously, and data is checked and stored on computers rather than on paper forms.

While costs have plummeted, there is obviously a point at which they can fall no further without damaging the systems that are in place. This, in fact, is the current situation. Community groups require some funding in order to meet administration costs (eg. postage, stationary, phone calls), equipment maintenance and fuel costs. If community groups are unable to meet such costs the good work they do, and the good will, are likely to be dissipated.

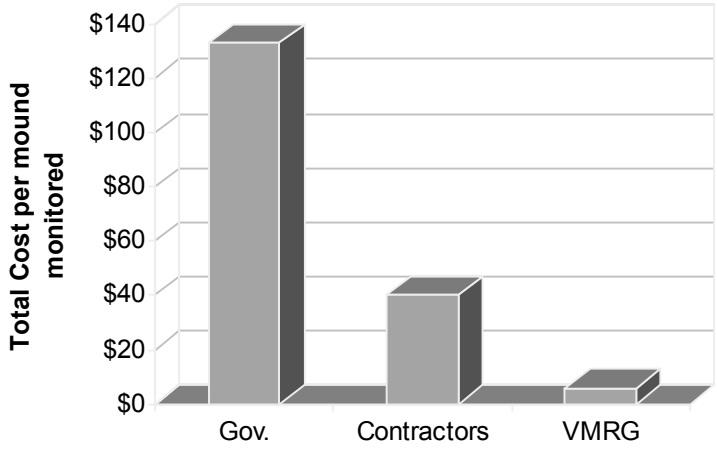

Figure 1. Total costs per mound monitored for the periods when the monitoring was conducted by government (Parks Victoria's predecessor) from 1991-1993 (10 sites, 300 mounds), consultants from 1994-1999 (19-23 sites, c. 600 mounds), and VMRG volunteers 1995-2003 (24 sites with 900 nests). Gov. costs do not include data entry or reporting.

Methods

In Victoria, Malleefowl monitoring has undergone many changes and improvements over the years, although care has been taken to ensure that data standards have been preserved. This is achieved by means of a set of standard definitions for every category on the datasheets: thus an "active" mound is defined as one that is currently being used as an incubator by Malleefowl and thus likely to contain eggs. Annual training days combined with social events also ensure that quality of data collected remains high. A detailed manual has also been produced, and it is currently being revised to reflect improvements over the past few years.

Searching sites

Most changes in the system have been improvements in the way data is collected, rather than what is collected. For example, searching sites previously involved working with compasses and carefully measuring out and marking areas to be searched (usually 4 km^2). Since May 2000, pocket GPS units have become accurate enough to satisfy all navigational requirements for monitoring without the need for any permanent markers through the study sites. Searching is now accomplished by uploading routes to be walked onto GPS units, although groups of people are still needed to search the sites efficiently.

Monitoring mounds

Routine monitoring is accomplished by teams of two or more people who visit every mound at a site. Mound locations are uploaded onto GPS units so that volunteers are guided directly to the mound of their choice. The monitoring data comprises a categorised description of each mound and is recorded either on a Palm handheld computer (preferred) or on paper forms. The Palm computers have greatly improved the monitoring system because they make data recording easier than on paper, and because once data is entered on a palm it can automatically be downloaded to databases for storage and analysis. This eliminates the time consuming, costly and error prone process of data entry that is necessary when data is collected on paper. The software we use on the Palms (Cybertracker) is specifically designed for simplified data collection in the field and is ideal for community volunteers.

Occasional re-searches: Efficiency vs Accuracy

In Victoria, we do not re-search every monitoring site every year, but rather visit known mounds every year and re-search sites every few years. This means that some active mounds might be missed if a site is not re-searched for a long time because Malleefowl do occasionally make new mounds. We have estimated that Malleefowl make new mounds at a rate of 1-2% per year. The main advantage in not attempting to re-search sites every year is a huge saving in labour: re-searching a site is about 20 times as labour intensive as just visiting known mounds. Put another way, visiting known mounds over three years provides 95% accuracy in breeding densities for about 5% of the labour cost.

Nonetheless, there is an important caveat regarding the interpretation of data collected by simply visiting known mounds in contrast to conducting full searches every year: Monitoring data may show a slight decline (estimated as 1-2%/year) where there is none because new mounds are not added to the monitoring lists every year. Thus, if the monitoring data shows a slight decline the site really needs to be re-searched to

assess whether the apparent decline is real. Table 1 expands on this point to consider other trends that may be apparent.

Table 1. Apparent and actual trends in breeding numbers as determined by monitoring only known mounds.

Monitoring suggests population has:	Actual population trend:
Increased	**Increase**
Unchanged	Unchanged, or increased
Declined	Declined, unchanged or increased

Victorian Results

Monitoring Malleefowl over the past 16 years in Victoria has provided a wealth of information on trends and conservation. We have found that while some sites show similar breeding densities from year to year, other sites show large fluctuations that are difficult to understand. This variability means that to get a reliable notion of the trends in large area we need to combine many sites so that the fluctuations at different sites can cancel each other out to reveal underlying trends.

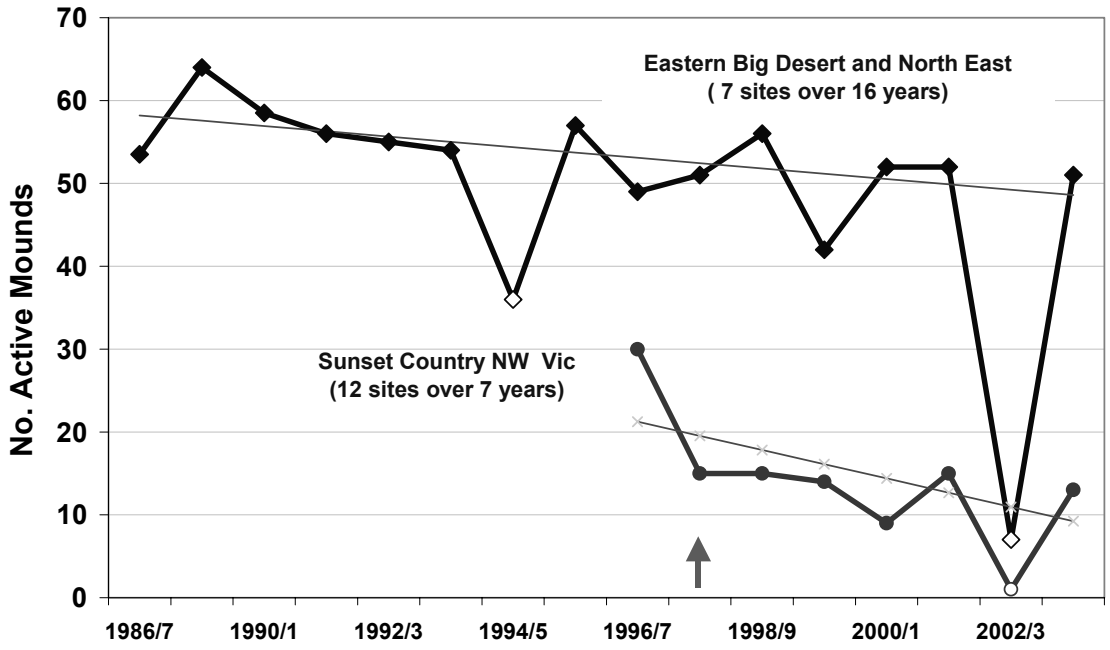

Figure 2. Combined monitoring results for sites in the far NW of Victoria (Sunset Country and Hattah/Kulkyne NP) and elsewhere (Eastern Big Desert and North East). Most sites were last re-searched for new mounds in 1996. Major drought years are indicated by white

Monitoring results for two regions in Victoria where we have sufficient information to assess trends are show in Figure 2. In the eastern Big Desert (Wyperfeld/Bronzewing area) and North East (Wandown area), there has been a slight decline of about 1% per year over the past 16 years (not including data from drought years). While this apparent decline is of concern, these seven sites have not

been re-searched for seven years so it is uncertain at this stage whether the decline is real. This emphasises the urgent need in Victoria to have the monitoring sites re-searched in order to maintain a high level of accuracy.

In the Sunset Country and Hattah/Kulkyne NP, Malleefowl breeding numbers have declined by about 50% over the past seven years (excluding droughts). These sites were re-searched at the same time as those in other parts of Victoria, but the decline is a much greater and of serious concern. While the cause of this decline is not fully understood, low winter rainfall over the past few years in this general area appears to be involved. Unfortunately, we do not have accurate rainfall data for many of these sites, and this highlights the need for such information if we are to make sense of future trends.

Where to from here?

There are three points I would like to make in conclusion:

1. Monitoring provides a foundation for management

Monitoring provides crucial data on trends in Malleefowl populations that are under pressure from a range of recent landscape-scale changes. Due to the cryptic nature of Malleefowl, targeted monitoring programs are the only means of assessing the species' conservation status. Measuring population trends is all the more important now that the climate appears to be changing.

Apart from providing information on trends, monitoring programs also provide valuable opportunities for measuring the effects of various management options such as fox and grazing control, fire regimes, and habitat manipulations. Indeed, the current Malleefowl monitoring sites across Australia have been greatly under-utilised in this regard.

2. Malleefowl need to be monitored across Australia

Monitoring is providing data that is essential for conservation and monitoring programs are required wherever the species occurs. Nationally, we need to standardise methods and centralise records so that data can be easily combined to provide regional impressions of Malleefowl trends. Techniques will vary in some cases (eg. tracking in arid regions where breeding density is not feasible), but national standards will also provide a more efficient basis for maintaining community support and analysing the resulting data.

3. Community groups everywhere could benefit from Vic experience

Developing and maintaining an efficient monitoring programs involves an enormous effort and is a considerable logistical challenge. In Victoria, we have been lucky to have the support of Parks Victoria over a number of years and this has provided the opportunity to develop and refine an efficient system. Monitoring is now easy, enjoyable and highly efficient, and the VMRG is now starting to collect additional data, building on the monitoring foundation. Community groups across Australia who are struggling with the challenge of monitoring Malleefowl could benefit from the processes and refinements that have made the Victorian system easy and enjoyable for volunteers. Critical components of this success, and of maintaining the high level of interest and professionalism amongst volunteers, are:

- The monitoring processes and administration are entirely run by the community
- The use of Palms and Cybertracker has simplified field work, eliminated data backlogs and improved data handling
- Annual weekends where training, AGM and social events are combined ensure a level of quality control and stimulate group harmony

Indeed, the administration is now so efficient that it would seem feasible to provide monitoring support for communities across Australia from a single office. This would not necessarily involve any loss of control by local groups of the work or data, but merely provide other groups with the benefits of equipment, processes and information to make their monitoring uncomplicated.