

18. Update on the National Malleefowl Monitoring Database: recent developments and new gear

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Abstract

The National Malleefowl Monitoring Database (NMMD) has become central to the monitoring effort across Australia, providing centralisation of records, secure storage, and a range of data management and reporting facilities. We have formed a data-handlers group for the NMMD comprising representatives from each state who are responsible for the collating and validating data onto the NMMD. We provide an overview and an update on recent NMMD developments and discuss directions for the future. In addition, we discuss the latest developments in field devices, particularly the Android smartphones. Smartphones are not as weatherproof or tough as Mobile mappers, Nomads or other devices, but they are much more powerful, take better photos and are much cheaper. The increased power of the Androids makes it easier to take photos than with the Mobile mappers, and recent developments that we commissioned in Cybertracker enable automatic extraction and naming of photos. These improvements greatly increase the efficiency of photo handling and make the Androids especially appealing for monitoring Malleefowl.

Introduction

Malleefowl conservation is the goal of the monitoring program in which volunteer 'citizen scientists' collaborate with agencies and academics to track the breeding numbers of these special birds across Australia. The rationale is simple enough: tracking breeding numbers through time provides us with information on trends in the population size of reproductive individuals – the all-important 'effective population' that contributes to the next generation – and clarifies the species' conservation status, while doing so at multiple sites also enables us to identify where Malleefowl are doing well and where they are doing poorly, providing us with the opportunity to learn about the species requirements, improve management, and target areas where intervention is most beneficial. A rigorous monitoring program is an essential foundation for conserving a species where there is uncertainty about effective management, which is why monitoring has been given a high priority in the National Recovery Plan for Malleefowl (Benshemesh 2007).

However, monitoring is not easy. There is, of course, the considerable effort required for people to annually visit mounds to check on their status which typically involves several days a year of walking in demanding conditions. But this is only part of a larger set of activities that constitutes the monitoring cycle. This annual cycle involves four broad steps:

1. Organising people to undertake the monitoring. This is usually done at a local or state level and involves training people (equipment use, data and safety protocols), allocating people to sites to ensure that all sites are monitored, making sure people receive what they need (equipment, maps, lists, etc.), and that all the equipment is up-to-date.
2. Collecting data. In the field, people need to navigate to each and every mound on the lists (updated each year), collect data, and return the data and equipment for processing.
3. Validate and update lists. Each year the data collected needs to be checked for errors and, where possible, these errors need to be rectified while things are still fresh in people's mind. Often, changes need to be made reflecting what people have found in the field: new mounds need to be added to sites, erroneous records need to be removed, and very old and inconspicuous mounds may be designated optional for most years but mandatory every fifth year. Checking the data also provides an opportunity to point out where people might be making mistakes and thus helps maintain high standards. Without an effort to keep things on track, any system is bound to wander and become corrupted in time, and eventually unintelligible.

4. Store and secure. Storing data so that it can easily be found and accessed for analysis is obviously essential; what's the point of collecting data otherwise? But it's also important to secure it so that it does not fall into the hands of people who might do harm. Experience has shown that local groups are not well placed to provide either of these data services and, alas, nor are governments.

Considering that there are over 130 sites across Australia containing a total of 4,000 mounds and that hundreds of volunteer citizen scientists are involved in the national monitoring effort for Malleefowl, it's easy to see the organisational challenge to support the field work is substantial. Yet it is essential to maintain a high standard of incoming data and to provide an efficient experience for volunteers and to make sure the efforts of volunteers is not wasted. Indeed, some data in the early days of monitoring was lost due to failures in data quality control or data storage; this seems such a waste considering the effort involved in the field to collect the data.

NMMD: a national solution to organising monitoring

The National Malleefowl Monitoring Database (NMMD) was developed by Richard, Margaret and Becky Alcorn to meet the national challenge of organising the monitoring. Its purpose is to support the great work done by communities across Australia in collecting the essential data on Malleefowl trends in different areas. The NMMD provides a centralised repository of monitoring data, and facilitates the organising that precedes fieldwork and the careful checking and validating that follows it, ensures the data is good and ready for analysis and helps to maintain standards by providing avenues for feedback.

The NMMD looks after the monitoring effort, but who looks after the NMMD? We have a data-handlers group comprising all those involved in handling data and equipment behind the scenes across Australia (Table 1). These are the people that keep the data flowing and ensure that the data is treated with the respect it deserves given both the enormous effort it represents, and the irreplaceable information it contains. The data-handlers group's main responsibility is moving data onto the NMMD and checking it (validating), but the group also makes decisions about further developments of the NMMD, chooses equipment, and generally looks for ways to make processes more efficient for everyone. This is critically important, because efficient processes are more sustainable in the long term, and Malleefowl monitoring is necessarily a long term activity. The data-handlers group only get to meet once a year (or less), but we keep in contact via email and of course through the NMMD.

Table 1. NMMD data-handlers in 2014-15.

WA	SA	Vic	National Administrators
June Meredith Joy McGilvray Carl Danzi	Graeme Tonkin Dave and Heidi Setchell Sharon Gillam	Peter Stokie Joe Benshemesh	Beckie Alcorn Joe Benshemesh

Understanding the NMMD

The NMMD is a secure database: access to it is controlled by passwords, and there are several levels of access that ensure that sensitive information (such as the location of mounds or sites) is only available to the few people who need it (such as people who visit particular sites and those who validate records). Anyone who contributes data can obtain a password to the NMMD so that they can see their data, leave comments or corrections, and view photos (Figure 1), but they can't see other people's data unless permission has been granted. Conversely, they may not want others to see their data and this can be arranged so that their site's location does not appear on maps or tables.

What Contributors can do on the NMMD

- **Review and annotate** their records
- **View** mound photographs
- **Download** monitoring forms, manuals and information
- **Look at** Maps of sites and mounds
- **Examine** Reports: Inspection, Activity and Environment

Figure 1. What contributors can do on the NMMD.

There are three main levels of access to the NMMD that reflect the differing tasks (Figure 2). Put simply, Coordinators organise people and gear; Contributors collect field data; and Ecologists make sure the data is complete and as error free as possible. They are all big jobs in their own ways but manageable provided protocols are followed because the NMMD expects data in a certain form and is designed to process this information.

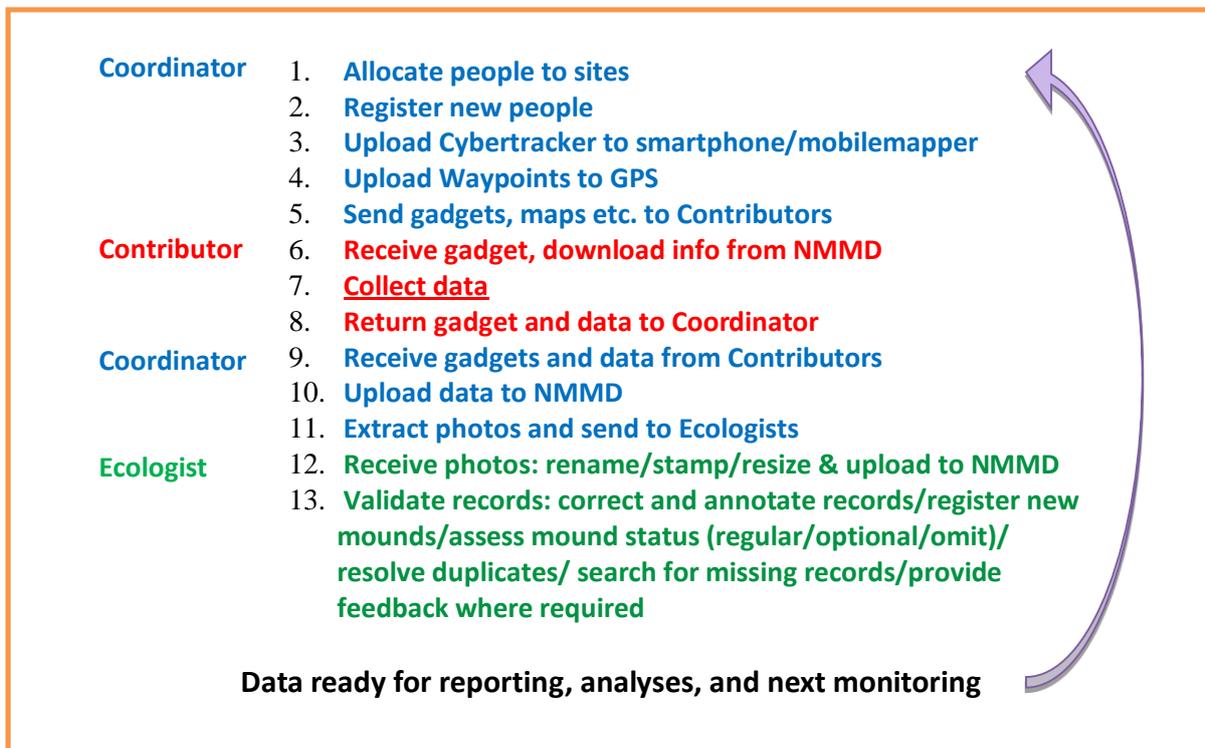


Figure 2. Routine tasks that make up the annual monitoring cycle. Tasks are colour coded to indicate those undertaken by contributors (red), coordinators (blue) and ecologists (green). Reporting and analysis of the monitoring results can only occur once all the listed tasks are complete.

New developments and gadgets

In an effort to make monitoring Malleefowl simpler and more efficient we have introduced various tools and innovations over the years, and expect to keep on the lookout for anything that might help people contribute to this important program. Realistically, only citizen scientist volunteers can collect Malleefowl monitoring data at the necessary scale, and we owe it to the volunteer community to make the tasks as smooth as possible, and to make the data as useful to Malleefowl conservation as possible.

Accordingly we introduced GPS units to the monitoring as soon as they became accurate enough (2000) and starting using Cybertracker on Palm handheld computers soon after (2002). Similarly we started using digital cameras in the mid-2000s and moved on to Mobile mappers several years ago because they offered a great improvement over the Palms - they could take photos and had a built in GPS - providing a neat package.

This season (2014/15) we have something much better than the Mobile mappers. We are now moving to Android smartphones because they offer more power, much better photos, a much larger screen, and generally better integration at a small fraction of the cost of Mobile mappers (about a tenth the cost!). The Androids are not as weather and shock proof as the Mobile mappers, but at that cost it hardly matters because even if they are broken or wetted, the data on the SD card should be safe. We have chosen a particular model on the basis of the size of the battery (longest lasting on the market) and cost, and they have been popular with Malleefowl monitoring because the smartphones are faster to respond and generally user friendly; they leave the Mobile mappers in the dust! The move to smartphones also means there is now no need to use digital cameras; the quality of the smartphone photos is superb and there is no unsettling delay as there was with Mobile mappers.

This means we can take all photos through Cybertracker, and to make things easier for the behind-the-scenes data handlers, we commissioned Cybertracker to make some modifications that have greatly reduced our handling time in processing photos. Each year, thousands of photos need to be labelled so that the NMMD can find and display them when you (and validators and analysts) examine the data on-line. Cameras automatically name photos (e.g. Photo0001) but these names need to be replaced with names based on the site code, nest number and season. Cybertracker also gives arbitrary names to photos embedded in data records, but the facility we commissioned will now export photos and give them a new name based on other data collected (such as site, mound number and season). This means that we don't have to laboriously re-name thousands of photos, which is a great saving in time. Photos taken with separate digital cameras still have to be re-named the old way by hand, so please take photos using Cybertracker!

Bugs and Gremlins

While the smartphones have made data collection easier, they are almost too smart by half. One problem that has concerned us is that using the smartphones to navigate to mounds is less reliable than it previously was in Cybertracker or by using a separate GPS. While the smartphones are as good as a separate GPS most of the time, every now and then the direction arrow points the wrong way. We have traced this to the compass feature in the smartphones (they have a digital magnetic sensor in them) which occasionally goes wonky. This does not happen often, but is disconcerting when it does. We will be trying to rectify this by next season by commissioning some changes to Cybertracker to compensate for what is actually a shortcoming of the smartphones (it seems to occur with other makes of smartphone too). Meanwhile, we have been recommending that people use separate GPS units to navigate to mounds, or if using a smartphone to pay more attention to the bearing and distance to target than the direction arrow.

Conclusion

The NMMD and progressively improved field gadgets have resulted in monitoring Malleefowl now being simpler and easier than ever before. The NMMD has become central to the monitoring effort, with its development overseen by the data-handlers group which provides a valuable service to data collectors, and implemented by professional database programmers (Becky Alcorn). Due to the efforts of the

volunteer citizen science community, we are collecting more and better quality data than ever before, and processing it more quickly and efficiently due to the NMMD and efforts of the data-handlers.

There is, however, more to do. As the Malleefowl monitoring effort grows, so have the opportunities to value-add to the monitoring, such as through the Adaptive Management (AM) Project which aims to improve management through evidence-based analyses. The AM Project will rely heavily on the flow of monitoring data and we will have to develop ways of delivering data from the NMMD to the team so that each year they are provided with the data they need to assess Malleefowl trends in relation to other variables, such as the abundance of predators, management actions, rainfall, etc. While much of this information is already on the NMMD, we will also wish to capture more, especially detailed management information and the results of the camera-trap program that is providing information on the trends of other animals, particularly foxes, cats and dogs.

Another direction for further development of the NMMD is in regard to the Malleefowl monitoring work undertaken in central Australia by Aboriginal communities. While our aboriginal colleagues collect information at mounds for the NMMD, other monitoring methods are also used, such as systematic tracking, and may be more appropriate in the sparsely distributed Malleefowl populations in the arid zone. The NMMD does not support systematic tracking yet, but may do so in the future. Having these alternative data on the NMMD would clearly benefit Malleefowl conservation by providing information on Malleefowl trends at the edge of their range where climate changes are likely to have major impacts, but would also greatly assist the efforts of Aboriginal groups by providing on-line tools for managing their monitoring data, offering safe data storage, and by demonstrating that they are part of a larger community of citizen scientists that are concerned about Malleefowl conservation and want to do something about it.

The main focus of the data-handlers group is undeniably to improve the flow of data, ensuring that every step from collecting data in the field, to its end use in analysis, is as easy, simple and reliable as possible. The entire system is purpose driven, and we want to make the system as efficient and sustainable as we can. But we are also keen to make the NMMD a useful portal for the contributors who are the backbone (and heart and guts!) of the Malleefowl monitoring effort. In the past we have introduced a number of features specifically for contributors (maps, photo views, reports, etc.) but we are always after more. Any other thoughts on how we can improve the NMMD for contributors will be greatly appreciated: please talk to your state representatives!

References

Benshemesh J. (2007) National Recovery Plan for Malleefowl. Department for Environment and Heritage. South Australia.