COMPUTERISED BANDING RECORDS:
DATA STORAGE, MANAGEMENT AND ANALYSIS

BRIAN FOREMAN

Arbury Park Outdoor School, Bridgewater, SA 5155

Recently bird banding data from several locations of long-term study have been stored onto a computer program from a card system. The process of this new system, along with its advantages and problems, are presented.

INTRODUCTION

Lane (1987) described a card record system used by many banders to store information in an ordered and useful way both for individual birds and, collectively, the total banded population. Variations on this system are widely used. In my population study at Arbury Park, Bridgewater, South Australia. (35° S, 138°45′ E), I have used the card system for seven years and have recently begun using a computer data base program developed by Bruce Male of the Australian Bird and Bat Banding Scheme (ABBBS) for trial and use by banders.

The first significant project was to store approximately nine years of accumulated data onto the program. This represented 10 000 encounter records. It was a tedious task, although an invaluable opportunity to review the scope and detail of the data. It took one hour to enter each hundred records. My failure to 'back up' all these data as I went along led to catastrophic loss of a large part of the data from the computer system and the subsequent need to retype them. There is a profound lesson for all in that.

This program has been written into dBase II for any microcomputer running dBase II dual disk drive and has been designed as an 'error trapped, user friendly, menu driven' system that requires minimal knowledge of the underlying dBase II language and software. Other than actual data entry and search criteria, the user is required to apply single key strokes in answers to questions or menu prompts, e.g., another search (Yes/No).

I have no great experience in operating computer programs. I was consulted when the program was being designed, and now have a program which stores the data rather as they were previously stored on the card system, but in fact designed with the same columns as the ABBBS Field Data Sheet. The ABBBS modified the programs for my use, that is, the additional data types that I collect were incorporated into my data base.

Once the computer is turned on and the data base program is started, the bander is presented with a menu of choices of which section of the program to use. The choices are *Store New Data, Edit, Search, Retrap Report, Sort by Band No Order, Biometric Analysis, Transfer to ABBBS,* and *Print Lists of Consecutive Records,* which can be made by entering a single letter into the computer.

MENU CHOICES

Storing Data

The most exhaustive task was storing data which had been accumulated over a long time period. However, on a regular basis data storage is fast. In fact, a non-ornithological typist can quickly type data from the field sheets onto the program. When this function is selected, the bander is presented with a series of empty boxes on the VDU screen where the band number, new banding/retrapped, species number, age, how aged, and all other banding data may be entered in sequence for each record.

There are inbuilt checks which ensure each entry is properly coded for species number, sex, date or whatever. It is impossible to omit a critical detail as the computer signals 'invalid data' and requires the user to check and re-enter accurately.

However, not all errors can be detected by the program. After each complete loop for a banding record the system automatically goes to the next band number. This is particularly useful where a long sequence of consecutive band numbers occurs.

Retraps

The Retrap function will display on the monitor all records stored for a bird, in date order, by simply typing in a band number on the computer. This allows an overview of individual histories, and a printout for any individual is possible.

Edits

The user can edit any record at any time. Just as in the card system, one occasionally discovers an error of some type. The user may also wish to review the data when new information such as size dimorphism becomes available and make appropriate edits.

Search

A search can be made for a particular set of records where one does not know a particular band number. For example, if the 'Greens' printout (summary of Banding Records) showed that the user had recorded a species number 381 (a Red-capped Robin *Petroica goodenovii*) and the users realize there must be an error, as the only robins handled were 380 (Scarlet Robin *P. multicolor*). A 'search' can be made to locate the erroneous record when the band number of the individual is not known. This could result from a simple error typing 381 instead of 380. The edit function is then used to correct the error. Searches can be made using single criterion or a variety of criteria such as species, location, dates, banding records and retraps, or combinations of these.

Data Transfer

Data transfer to the ABBBS is also simplified because the program has the capacity to print a 'Greens' summary of all birds not yet sent to the Banding Office. The banding data are stored on the disk in the format required by the ABBBS for transfer to their computer system. This is a great time saving function, and figures automatically balance. Copies of data sheets are still submitted with the transfer disk.

Listings

Listings can be made of your birds under any category, including birds for one species, individuals from one trap site, all birds for particular times of the year, and any other small or large list. In printed form these lists are interesting to peruse and for highlighting trends or special data.

Other Biometric and Moult Data

There is another function yet to be added to the program. That is one of biometric and moult data storage and analysis — presenting basic statistics such as range, mean, etc. Various comments I add to cards are not possible on my computer program, such as growth on foot, brown lores, etc. but for simple moult data, (none, partial, completed, etc.), the current program is sufficient. An extra field can be added for this if desired, by typing a new box (column) onto the program.

Trap Sites

The storage routine can also identify trap sites within your location code. For example in the location code for Arbury Park (a 200 acre property) trap site codes are also used on the program, e.g., MG (Mt. George), CB (Creek Bridge), AG (Appy Gully), etc., in addition to the Locode (AP). This was also used on the card system, and is useful for noting movements or non-movement of birds.

Printing

The program has also the capacity to print groups of records. This is particularly handy after spending an hour or two putting in several hundred records. The computer can then print out that group of records and you can visually run a quick check over them to see whether there is a need for minor edits, e.g., a band prefix 041 for an 014. This also can print, if required, large groups of records (such as your total data) but is particularly useful for printing all records not yet sent to ABBBS just prior to sending them a Greens summary. It avoids finding odd errors afterwards in the Greens summary and having to advise ABBBS that data require editing at that end.

Data Analysis

After the immediate needs of storing and managing data have been achieved with the computer system, the way is open to quickly and easily investigate the large number of data that has been accumulated. These analyses are cumbersome when working from a card system.

One of the first analyses that I did was to check some of my measurement data against the sexing criteria given by Rogers *et al.* (1986) (Table 1). The percentage identified among the adult birds as males, by the measurement criteria, was unsatisfactory in respect of Grey Fantails *Rhipidura fuliginosa* and Yellow-faced Honeyeaters *Lichenostomus chrysops*. Further investigation of these data is required.

Other easily made analyses are moulting patterns (seasonal variation in moult scores); plotting body measurements (as a first step in distinguishing age/sex size groups); periods of presence/absence of species (determination of migrants); and growth rates and longevities of individual birds.

Availability

Banders can request customised data base programs from the ABBBS but must obtain dBase II system programs for themselves. Programs are being upgraded for dBase II and III plus, and analytical programs are planned.

DISCUSSION

I have found some advantages and disadvantages in changing from the card system to the computerised system. The advantages as outlined above include the ease of transfer of data to the Australian Bird and Bat Banding Scheme through speed of data collation and subsequent species summaries. Also copies of the complete data can be made on another disk at any time in a matter of moments; such duplication from the card system is not possible without enormous work.

Although my analytical investigations of the data have been limited, they have been fast and accurate, and already have revealed interesting possibilities for further investigation. Other data analyses and formulation of graphic summaries are also convenient.

TABLE 1

Sexes of birds based on total head length*.

	Total	Male	Female	Unsexed
(sp. 361)				
Grey Fantail	97	3	71	23
Rhipidura fuliginosa		(3.1%)	(73.2%)	(23.7%)
(sp. 614)				
Yellow-faced Honeyeater	173	9	67	97
Lichenostomus chrysops		(5.2%)	(38.7%)	(56.1%)
(sp. 578)				
White-naped Honeyeater	184	83	61	40
Melithreptus lunatus		(45.1%)	(33.2%)	(21.7%)
(sp. 445)				
White-browed Babbler	57	13	4	40
Pomatostomus superciliosis		(25.9%)	(7.0%)	(70.2%)
(sp. 638)				
Red Wattlebird	85	22	45	18
Anthochaera carunculata		(25.9%)	(52.9%)	(21.2%)

*Sexing criteria from Rogers *et al.* (1986).

In terms of disadvantages, it is true to say that as the number of records exceeds 10 000, the search for retraps is marginally slower than it is in the card system (about 90 seconds), and some aspects of sorting data need to be carried out overnight. Some of these sorts now take eight hours to complete; that is, it requires eight hours of computer time, not eight hours of operator time. As mentioned earlier data security is most important, and backup copies of data need to be made regularly and kept at various locations. There is currently some limitation in storing anecdotal evidence compared with the ease of doing so on the card system. Overall, the computer system appears far more efficient than the card system, and as these systems are used more in the near future, I am sure their possibilities will be further explored and promulgated.

ACKNOWLEDGMENTS

REFERENCES

Rogers, K., Rogers, A., Rogers, D., Lane, B. and Male, B. (1986). 'Banders Aid. A Guide to Ageing and Sexing Bush Birds'. (The authors: St Andrews.)

Lane, S. G. (1987). Data record cards: their history and method of use. *Corella* 11: 121–123.