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A REVIEW OF THE USE OF COMPUTERS BY BIRD CLUBS

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SUMMARY CIRCULATED TO BIRD CLUBS

Every year bird clubs collate an enormous amount of ornithological data. The local recorder(s) devotes a great deal of time to cataloguing and sorting all the records, and newsletters and annual reports are regularly produced. With clubs receiving thousands of records each year, the task of managing such a large volume of data can be quite time consuming. Bird data have many potential applications in conservation and research, providing the data are easily accessible. For instance, some bird clubs provide their local County Trust with site related bird data, which may be used to help protect a site from development. These type of data are extremely difficult to collate in a species card system, and some improved record management system is required.

The needs for greater efficiency have prompted several clubs to design and implement computer systems to manage their bird records. Until recently the expense involved in developing and implementing a computer system has meant that only those organisations with substantial financial resources could consider such a venture. However, with the general decrease in the price of personal computers, coupled with an increase in the availability of software packages, such systems are now affordable by many clubs. Indeed, in the last two years there has been widespread interest in the benefits of such developments. The general interest expressed by bird clubs in the potential use and value of computers in bird recording was one of the major factors leading to the commissioning of this "Computers and Bird Clubs Review" and is one of the services offered to clubs through the BTO/Bird Clubs Partnership Scheme.

To establish the degree of interest in computerisation of bird records, a questionnaire was circulated. This was used to gauge club's views on the possible involvement of computers in bird recording. The opportunity was also taken to catalogue several

aspects of a club's recording, including how a club rates their current system, how many records are received annually and which clubs use a recording card. A handful of clubs are already successfully using computers to handle their bird records and smooth the running of their club. Of the clubs using a manual system 70% were interested in the computerisation of bird records. From all the clubs which were surveyed, only 4% thought that computers and bird recording were not a "good idea".

Some of the computer systems already in use by bird clubs are examined and discussed. They give a good insight into what can be achieved and show how useful and efficient a computer system can be. A computer system offers a whole range of facilities that have real value to a bird club. Much of the tedium associated with cataloguing large numbers of records is reduced, but more importantly, the data are stored in such a way that they can be used to their full potential.

The necessary software and hardware to implement a successful computer system for managing bird records are discussed. The County Bird Recording Application (COBRA), developed by the company ANTEC, is a package that is available for use now, and the possibility of further developments involving BTO/RSPB are being pursued. Also being considered is the possibility of BTO and RSPB working together to produce software which could then be distributed to bird clubs. Discussions regarding these two options are continuing and final recommendations for software will be sent to bird clubs in three to six months.

When considering the virtues of such a venture, cost and value for money are often of prime concern. With regards to cost, it is worth noting that several of the clubs that already operate a computer system managed to ease the "expense-hurdle" by stimulating financial support locally, and any club considering the purchase of a computer system may find it beneficial to approach local authorities/companies in an attempt to raise funds. As for value for money, a bird club must assess its

needs and evaluate whether or not a computer system will assist the running of the bird club and increase the value of their data. If the answer to these are "yes", then a computer system for managing bird records can be installed for between £1800 and £2500 (excluding VAT).

1. INTRODUCTION

The last few years have seen computer systems play an increasingly important role in biological recording. Several national organisations are devoting a great deal of time to the development of biological recording packages to manage their large volumes of data. The Royal Society for the Protection of Birds (RSPB) has a sites and species database and the Nature Conservancy Council (NCC) has various systems to manage different areas of their data. The Royal Society for Nature Conservation (RSNC) is keen to install a suitable system in the County Trusts and several pilot schemes have been established. The British Trust for Ornithology (BTO) has major data sets stored on their computer systems, including the results of the Common Birds Census (CBC) and the data for the Atlas of Breeding Birds of Britain and Ireland. The Wildfowl and Wetlands Trust (WWT) also store their important data sets on their system, such as the National Wildfowl Counts.

Biological data have many applications ranging from research, such as single species studies which may involve the examination of population trends over a period of time, through to conservation, which for site safe-guard may require details on the species that occur at a particular site. To be able to address such questions, fast and easy access to data is essential. For instance, to respond quickly to an environmental threat an organisation must be able to produce information about the site, comment upon its value as a habitat (or mosaic of habitats) and show which species are known to breed or occur. As an extension of this, any national or international importance that can be attached to the site needs to be spotted quickly. The only way to achieve the required degree of efficiency when retrieving such information is to store the data in a computerised database.

Until recently the expense involved in developing and implementing a computer system has meant that only those

organisations with substantial financial resources could consider such a venture. However, with the decrease in the price of personal computers, coupled with an increase in the availability of software packages, such systems are now affordable by many bird clubs. Although a few clubs have been using computer systems since the mid 1980s, it is only in the last two years that there has been widespread interest in the benefits of such developments.

There are over 110 bird clubs, with a collective membership exceeding 45,000. The activity of this army of birdwatchers results in the accumulation of large volumes of data. The more interesting records may find their way into an annual report, while the raw data are hidden away in the depths of a recorder's home or local museum. There is a wealth of potentially interesting information contained within these observations, the value of which has never been truly explored or evaluated.

A few bird clubs have designed and implemented their own computer systems, and several others are in the early stages of development. The general interest expressed by bird clubs in the potential use and value of computers in bird recording was one of the major factors leading to the commissioning of this "Computers and Bird Clubs Review" and is one of the services offered to Bird Clubs through the BTO/Bird Clubs Partnership Scheme.

The report discusses current developments in biological recording with emphasis on the management of bird data. It examines several examples of systems already in use by bird clubs, highlights the benefits of these systems and discusses the general requirements for the development of such systems.

2. POTENTIAL VALUE AND USES OF DATA COLLECTED BY BIRD CLUBS

Summary

The activities of casual birdwatchers and bird clubs lead to the accumulation of large volumes of data. These data are potentially useful in various ways, but presently they are little used for conservation or research due to difficulties of access.

The areas of possible use are discussed, with particular emphasis on the potential for monitoring populations of scarcer species not adequately covered by national surveys, which have implications for research and the planning of conservation policy, and on the value of bird data in conservation, providing supporting information with respect to threats to sites.

2.1 INTRODUCTION

The records collected through casual birdwatching, along with the results of more specific surveys and atlas work that some clubs undertake, could be useful in a variety of ways:

1) For assessing population trends
   - from casual records
   - from local surveys

2) For mapping distributions
   - from local surveys; breeding and winter atlas.

3) For highlighting and protecting important sites

It must be stressed that these are potential uses - the

necessary information may exist in the records but to be of real value it must be :

- easily accessible
- accurate (enough detail)
- sufficient in quantity

The feasibility of using casual bird records will be dictated by the levels of these criteria. Any information should also be unbiased with respect to the analyses being performed, or it should at least be possible to make some assessment of any bias which is likely to be present.

2.2 USE OF CASUAL RECORDS TO ASSESS POPULATION TRENDS OF BIRDS

There are several long running national schemes monitoring the bird populations in the United Kingdom. The BTO began the Common Birds Census (CBC) in 1962 and the Waterways Bird Survey (WBS) in 1974. Both these provide annual population indices of the commoner breeding birds of farmland, woodland and waterways. National wildfowl counts have been carried out since 1947, and wintering populations of waders and wildfowl have been counted on British estuaries since 1969 through the BTO's Birds of Estuaries Enquiry (BoEE). These are all invaluable projects providing details on the status and population changes of common British birds. There have also been occasional specific surveys; for instance, Heron census (since 1928), Mute Swan survey (1983 and 1990), Sawbills survey (1987). However, for many bird species, particularly those which are scarce or local, there are no data collected to assess annual population trends or the patterns of local occurrence. These data are of particular value to conservation organisations such as the NCC and RSPB. The large volume of records that casual birdwatchers accumulate could provide useful data for assessing the population trends of these birds not otherwise regularly censused. It is likely that casual bird

records will only be useful for assessing trends of uncommon species as records of the more common species are rarely submitted.

2.2.1 Studies on population trends using casual bird records

Using information from the annual Derbyshire Bird Report, Frost (1986) showed that in three 5-year periods over the years 1970-1984 inclusive, the total numbers of wintering Rock Pipit (Anthus petrosus), Waxwing (Bombycilla garrulus), Great Grey Shrike (Lanius excubitor), Hooded Crow (Corvus corone cornix and Snow Bunting (Plectrophenax nivalis) had all markedly declined, while declines also occurred in the largest annual flocks of Jack Snipe (Lymnocrptes minimis) and Brambling (Fringilla montifringilla). These apparent declines were despite a 70% increase in the number of contributors to the annual report over the 15 year period and Frost questioned whether they were widespread.

A similar analysis, looking at the same species, was carried out in the neighbouring county of Leicestershire (Mason, 1989) using the information in the annual report of the Leicestershire and Rutland Ornithological Society. Mason used a longer time span of 30 years, 1957-1986, over which there had been a 5-fold increase in observers. He detected similar declines to Frost. Taking his analysis one stage further, Mason suggested a model for calculating an index of abundance: $I = x/n \times 100$, where x is the annual total of observations for a species and n the number of contributors to each annual report. The validity of this model is perhaps questionable as the relationship between number of observers and number of birds recorded may not be linear.

In a more recent study, Mason (1990) extracted further data from the annual bird report of the Leicestershire and Rutland Ornithological Society, for the years 1943-1987. Where the

summary in the annual report was inadequate the original archive, held in the Leicestershire County museum, was consulted.

He examined the population trends of 16 scarce species, and despite a comparatively small number of records each year, the trends detected from the reports fit what little is known of annual changes in numbers from other sources. For example, his results for Grasshopper Warbler (Locustella naevia) show a peak for the period 1967-1972, and a decline since then with a slight brief recovery in the late seventies and early eighties. Data from the CBC, although barely sufficient for the construction of an index, suggest that the population of Grasshopper Warbler has been in steep decline since a major crash during 1972-1974 with a temporary partial recovery around 1980 (Marchant, J.H. et al. 1990). Riddiford (1983) calculated indices of spring and autumn migration using daily census data from nine British bird observatories over the period 1964-1981, and his figures indicate a similar trend with a sharp population drop in 1973 and continued low levels since then. Mason's results follow the trend indicated by these other studies, except that the decline occurs slightly earlier. However, other studies indicate that in the case of breeding species which may be on the edge of their current range, it is these peripheral populations in which the first signs of population change can be detected (Davis, 1982).

Mason's work has good potential, but there are several weaknesses: no attempt is made to assign statistical confidence intervals, and running means will hide a lot of short-term variability. To be able to calculate confidence intervals data would be needed from several counties (or other recording units); the best method to approach this would require further research. Data need to be split by time of year for many species so it is clear which populations are involved. Finally, no attempt is made to validate the trends in a statistical way. This would require the selection of some species for which an independent quantitive index can be

produced; for example, it could be possible to plot inland wader counts (Mason 1988) against BoEE indices. It would also be interesting to see how trends in bird club records for some of the commoner Rare Birds Breeding Panel (RBBP) species compare with the trends of annual numbers of breeding pairs.

These papers suggest that there is much information contained within county bird reports, most of which is unused. Some interesting studies have been carried out, all of which indicate the potential value of casual records for assessing population trends of scarce species. It must be stressed that there is only real value for scarce species as only these will be consistently recorded.

Looking to the future use of these records, there are great possibilities for creating population indices for scarce species. All county recorders could submit totals of locally scarce species along with the number of observers so that a population index could be derived. Furthermore, it would be possible to calculate retrospective indices back several years. An objective method would be required to assess when trends require further action and Mason (1990) suggests that one approach may be to adopt the cusum chart procedure widely used by quality control managers and for which formal techniques exist for assessing significant changes in trends.

2.3 MAPPING DISTRIBUTIONS

In the mid-sixties, before work was begun on "The Atlas of Breeding Birds in Britain and Ireland" there was much debate amongst ornithologists as to the scientific merits and feasibility of such an enormous national survey. However, all generally agreed that such a publication would be "...a potentially invaluable tool for conservation and of considerable importance as a permanent record, for future comparisons, of bird distributions at a time of great

environmental change." (Sharrock 1976). The atlas was undertaken and published in 1976, after 5 years of fieldwork involving some 10,000 to 15,000 observers and several years of analysis and preparation. The quality of the work is a tribute to all those who were involved, and the atlas forms an invaluable reference. The success of this first national atlas laid the foundation for other such surveys : "The Atlas of Wintering Birds in Britain and Ireland" (Lack, 1986) and the soon to be completed New Atlas of Breeding Birds (fieldwork 1988-1990).

The concept of atlasing has been taken up by amateur organisations across the country, and several bird clubs have undertaken a county atlas :

Bedfordshire	(Harding, 1979)
Devon	(Sitters, 1988)
Gwent	(Tyler et al. 1987)
Hertfordshire	(Mead & Smith, 1982)
Kent	(Taylor et al. 1981)
London	(Montier et al. 1977)
Manchester, Gr.	(Holland et al. 1984)
Norfolk	(Kelly, 1986)
Sheffield	(Hornbuckle & Herringshaw, 1985)

Rather than use the 10-km grid adopted by the national surveys, the county atlases use 2-km squares or tetrads. Atlasing by tetrad inevitably means much more fieldwork, and only counties with a good number of keen and competent birdwatchers have the resources to undertake such a survey. The resulting distribution maps can show much more detail than a 10-km survey and offer the opportunity to relate bird distributions to land class.

The task of analysing the results of several years fieldwork is a daunting one even in the smaller counties. In Devon, where 1,834 tetrads were surveyed, they turned to a suite of computer programs to handle the data, which not only assisted the

production of the atlas but also led to a degree of analysis not possible with a manual approach. Shropshire and Sussex are part way through their atlas fieldwork and they each have their own computer system (both of which are discussed in chapter 4). Other bird clubs are also involved with the production of a breeding atlas including Clyde, Essex, Hertfordshire, London and Suffolk, and several of these are looking for a suitable computer system to assist with the analysis stage.

County atlases are valuable surveys that provide in-depth local knowledge that is potentially valuable for conservation and research. The work involved in their production has prompted several clubs to turn to computers, and this trend is likely to be continued by other clubs who are in the closing stages of their atlas work.

2.4 USE OF BIRD DATA FOR SITE ASSESSMENT

Regional, County and District planning authorities in the United Kingdom are becoming increasingly involved with nature conservation. Many local authorities have developed a very sympathetic attitude to wildlife protection and recognise the threats from industrial, urban and recreational developments. It is also more widely appreciated that wildlife resources are an integral part of attractive environments, in urban areas as well as in the countryside.

Nationally important sites are well documented. The NCC has declared, in Great Britain, 5,184 Sites of Special Scientific Interest and 234 National Nature Reserves (NCC 15th Report, pages 94-95). Many County Trusts have inventories of sites they consider to be of conservation importance, and the name and number of these lists is quite extensive (Pritchard, 1986). Apart from sites that have some obvious zoological importance, for example, an estuary for birds, most of these sites are selected on botanical criteria. This leaves many other equally

important sites unregistered. However, it is only too apparent that areas which are botanically poor may be good for other animal classes. For instance, in one county, wet meadow sites important for breeding waders were not picked up in the botanically based survey simply because the plant diversity was low when compared to other similar areas in the county. To avoid such oversights the Trust is now trying to evaluate sites through other biological groups, with special attention being given to ornithological and entomological criteria. This has resulted in botanically poor sites becoming registered as prime sites based on their breeding populations of birds; for the wet meadow sites this was breeding populations of Redshank, Snipe and Lapwing. This botanical bias is not uncommon in the County Trusts, although there are gradual moves to try and correct the problem. In areas where there is close liaison between a conservation body, such as the County Trust, and a local bird club, many important ornithological sites have been highlighted and added to the register of prime sites.

The importance of conserving these sites is widely appreciated. The 1981 Wildlife and Countryside Act makes special provision for protecting SSSIs. The Department of the Environment circular 27/87 on nature conservation stresses the role of local planning authorities in protecting the natural environment. In paras 38 and 39 (Annex A) the circular encourages local authorities to consider opportunities for contributing towards nature conservation through policy making land management and scientific projects. Para 32 indicates the responsibilities of local authorities to consider nature conservation in individual planning applications. The final paragraphs of the circular (41 and 42) point to the contribution of voluntary bodies, such as the County Trusts, in providing advice to local authorities. The County Landowners' Association and National Farmers' Union's joint Statement of Intent 'Caring for the Countryside' acknowledges the farming community's role in wildlife conservation, while the NFU's subsequent statement 'The Way Forward, New Directions for Agricultural Policy' made it clear that farmers and growers

must seek to operate in harmony with sensible environmental and ecological objectives. All Ministers, government departments and public bodies are obliged to 'have regard to the desirability of conserving the natural beauty and amenity of the countryside', under section 11 of the Countryside Act 1968.

While the most important sites at a national level are recognised, there are many other sites which it is necessary to conserve if the diversity of habitats and species is to be maintained at a more local level. Although there may be information available on the importance of a particular area, cases for defending wildlife sites at public enquiries need to be supported by detailed biological information, which should include, for example (Gemmell, 1985) :

1) Vegetation maps showing soil-types, habitats, plant communities and important wildlife species.

2) Comprehensive records of plant and animal species including flowering plants, birds, mammals, fish etc.

3) Lists of breeding animal species, particularly birds.

4) Records of unusual or rare species and unusually large populations of important species.

5) Indications of the potential of sites for increased wildlife importance through successional changes, management, colonisation by additional species and the growth of populations etc.

Data collected by bird clubs could provide some of this supporting information.

From a more ornithological perspective, when RSPB becomes

involved in site protection at the regional level there are several areas of ornithological interest that are stressed:

- importance of the site for bird populations; particular reference to wintering and migrating bird populations which exceed the 1% national/international level.

- all breeding species

- notable breeding species

- Schedule 1 species

- total of bird species recorded

This information is taken from any local publication, such as the annual bird report, and/or local surveys. Additional information may be obtained through discussions with local bird watchers, especially the county recorder. The necessary information takes a great deal of time to find and collate.

An example of a development with which an RSPB Regional Office has recently been involved is shown in Appendix A1. In this report the arguments for refusing planning permission are set out in detail. The ornithological detail included in the report is only a slight expansion on the kind of data already held by a bird club. There is a list of breeding species, with emphasis given to the important species for the habitat, as indicated in the NCC publication 'Guide-lines for selection of biological SSSIs'. This publication lists the important breeding bird species for habitat types. Standard values (based on the total national estimated breeding population) are given for the selected species and a threshold value is then calculated for each habitat type. The occurrence of any Schedule 1 species is stressed, as is the importance of the site for any wintering or passage bird populations. For wildfowl and waders these are related to the qualifying levels for national and international

importance, as published each year in 'Wildfowl and Wader Counts' (Eg, Salmon, et al. 1990).

This sort of ornithological site data is extremely valuable. Most County Trusts do not have a great deal of effective ornithological data for sites and they often rely upon local contacts and/or strong ties with a local bird club to supplement their own site-related data. It is the bird clubs that hold this essential information about sites of ornithological interest. Since it is not generally held by any other organisation at a local level, it is invaluable.

2.4.1 Retrieval of site data from a bird club computer system

Site based data are very difficult to retrieve from a typical species card filing system or annual report. However, a computer system could allow site data to be collated easily and efficiently. As a test of the value of such a system Ken Smith from the Hertfordshire Natural History Society was asked to provide all the club's information about two sites, for the last two years; Chesunt Gravel Pit and Northaw Great Wood. The information arrived by post two days after the request, and had only taken a few minutes to collate (the data for Northaw Great Wood is included in Appendix A2). The quality of these data were compared to the ornithological data in the RSPB report for Rainham Marsh (Appendix A1).

With all the information in one report it is a relatively simple task to put together a statement of a site's importance. However, this is only really possible if there are an adequate number of records. Only those sites which are regularly watched will receive sufficient coverage and have a large enough catalogue of records from which to draw useful information.

Chesunt Gravel Pit is a well watched site and a good number of records are submitted for it each year. From the site report,

produced from the Hertfordshire computer system, it is a relatively simple task to pick out the important details. For the period 1985-1989 (additional data for the years 1985-87 was extracted from The Hertfordshire Bird Report) the site has been nationally important for Shoveler (Anas clypeata), regularly holding over 1 per cent of the estimated British wintering population, and internationally important for Gadwall (Anas strepera) (Table 2a). In 1989 Coot (Fulica atra) also reached a nationally important level.

In 1988 and 1989 the site supported between 3 and 5 pairs of Kingfishers (Alcado atthis), a species given special protection under Schedule 1 of the Wildlife and Countryside Act 1981. The site also holds an important assemblage of breeding bird species of lowland open waters and their margins (Table 2b). In the two years which the report covers the site has attracted over 85 different species. This figure excludes many commoner species, for which no records are submitted.

Comparing this with the example report prepared by the RSPB objecting to a proposed development on Rainham Marsh it is quite apparent that these data could form the basis of a detailed account of the ornithological importance of the site. The considerable reduction in time, through the use of a computer system, for the collation of the site-related data is of great value. Indeed, a large proportion of time for any case is taken up with collating the data, so a site report from a bird club in this form allows a quicker response to be made.

There are several areas where the bird data for Chesunt Gravel Pit are a little thin. The impact of the data could be improved by having a complete list of all the species recorded at the site along with a list of all the species that are known to have bred. This does not need to be an in-depth account and it is unlikely to involve much additional fieldwork. All that is needed is a little more acknowledgement of the commoner species; a simple presence/absence would be quite sufficient.

Table 2a The maximum numbers of wildfowl recorded at Chesunt Gravel Pit for the period 1985-1989.

	1985	1986	1987	1988	1989
Wigeon	60	22	90	30	57
Gadwall	215	120	185	200	453
Teal	75	40	33	30	91
Mallard	185	195	95	139	78
Shoveler	110	80	80	115	92
Pochard	90	70	45	45	50
Tufted Duck	340	300	425	415	280
Goldeneye	7	14	20	20	6
Coot	550	590	470	535	1212

Counts meeting the qualifying level for national importance are underlined.

All the counts for Gadwall were also internationally important.

Table 2b Bird populations of lowland waters and their margins breeding at Chesunt Gravel Pit (numbers of pairs).

	1988	1989
Great-crested Grebe	24	27
Mute Swan	2	2
Gadwall	1	2
Shoveler	1	1
Pochard	0	1
Tufted Duck	18	36
Cuckoo	3	3
Kingfisher	2/3	5
Grasshopper Warbler	0	1 male
Reed Warbler	40	51
Sedge Warbler	58	57
Reed Bunting	20	24

Furthermore, this would only need to be done for the main ornithological sites. If bird clubs start to use their data for site safe-guard, the need to improve the quality is likely to become apparent. Observers are likely to be encouraged to submit more detailed records if they think they will be used.

Information for Northaw Great Wood provides a contrast to this case in that even though the site is well watched very few records are submitted. For this site the data are insufficient to produce a detailed account of the ornithological importance of the site. However, the occurrence of interesting species, particularly breeding migrants such as Tree Pipit (Anthus trivialis) and Nightingale (Luscinia megarhynchos) is well worth stressing, especially in a local context.

To bring the ornithological data up to a suitable level of detail, information would be needed about all the species recorded at the site, along with a list of all those that are known to breed. From such a report it would then be a fairly simple task to highlight which important species breed and whether any Schedule 1 species occur.

Fast access to site data is a very positive way that bird clubs can utilise their data to highlight and protect locally important ornithological sites. However, to be of real use the site must receive regular coverage that includes records of all species, not just the more interesting ones.

2.4.2 Banbury Ornithological Society (B.O.S) and local conservation

The approach to conservation in the Oxfordshire area is very well organised, and at least twice a year the regional NCC representative, RSPB representative, County Naturalist Trust and bird clubs all meet. Important sites are brought to the attention of the NCC representative. It is the NCC

representative who usually hears of any development threats to the locally important sites (as highlighted in the meetings) and contacts the bird club requesting data to support a case against the proposed development. Requests for bird data may also come from club members or local residents wishing to object to development plans announced in the paper. In every case the value of the site and the likelihood of an appeal succeeding are assessed before an objection is raised.

Three cases with which B.O.S. has been involved are listed in table 2c.

Table 2c Proposed site developments which B.O.S. produced bird data to oppose.

Year	Site	Proposed Development	Details
1990	Mollington Wood	Strategic leisure & paintball games	
1988	Woodford Halse railway cuttings	Infill refuse site for the Northamptonshire County Council	Appendix A3
1986	Horley Wood	Picnic area and trials bike park	

When a request is made for information on the birds occurring at a particular site there is not usually much time for the club to act. However, for the cases listed in table 2c, all the records since 1982 were scanned for relevant records in just one evening. With between 5,000 and 7,000 records submitted a year, this could not be done with a manual system to such a deadline. For the period 1975-1982 only records of certain species were kept; these too were scanned. The results of the breeding atlas survey were also included.

From the site data it was a relatively simple task to compile a comprehensive list of all the species recorded at the site along with a list of all those known to have bred. This basic ornithological information is essential in a report of this kind. Special attention was drawn to the occurrence of any notable species, but no mention was made of Schedule 1 species. Of additional value in the Woodford Halse example was that it takes a wider ecological perspective than just birds.

A report is compiled by the B.O.S's conservation officer, NCC representative, and if applicable, the person objecting to the proposed development.

All objections supported by data supplied by B.O.S. resulted in planning permission being refused.

B.O.S has been using a computer system for eight years, and since 1982 all the bird records submitted to the recorder have been stored on their system. The club has played a central role in local conservation issues, providing valuable information on birds which has saved several important sites from development - a role they could never have hoped to fulfil with a manual system.

3. CURRENT RECORDING PRACTICES AND VIEWS ON COMPUTERS IN BIRD CLUBS

Summary

With bird clubs showing an apparent increase in their interest towards the computerisation of bird records a questionnaire was circulated to gauge their views on the possible involvement of computers in bird recording. The opportunity was also taken to catalogue several aspects of a club's recording, including how many records are received annually, how many clubs use a recording card and which clubs use short-hand species codes.

3.1 INTRODUCTION

A questionnaire (sample in appendix B) was circulated to bird clubs and county recorders in order to gauge their reactions and attitudes towards the potential involvement of computers in bird recording. The opportunity was also taken to catalogue several aspects of a club's recording; how they currently manage their bird records; how satisfied they are with their system; which details are regularly submitted on a record and whether any short-hand codes are being used.

A copy was sent to every county recorder (number = 82), and bird clubs either in the partnership scheme (number = 42) or with a membership of more than 200 (number = 37). Many clubs and recorders returned a joint questionnaire, and altogether 72 different clubs/recorders replied.

Overall, the response was very encouraging, and the topic of computers and bird recording certainly stimulated some interesting replies.

3.2 QUESTIONNAIRE RESULTS

The questionnaire results have been split into the following sections.

3.2.1) Methods of recording
3.2.2) Which values are recorded
3.2.3) The number of records submitted annually to clubs
3.2.4) The use of codes
3.2.5) Recording cards
3.2.6) Current uses of data and areas clubs would like to explore
3.2.7) Where more information is required
3.2.8) Views on computers

3.2.1 Methods of recording

The majority of recorders operate a manual filing system. This is typically based upon species-cards (67%), but other methods involve log books and species sheets. Thirteen clubs have moved over to computers.

Table 3a: Methods of recording

Card-based systems	Other manual systems	Computer systems
48	11	13

The system assessments for each method of recording are shown in Fig.3a.

Although there were several complaints about the space occupied by cards, manual systems generally performed adequately for management of records, and 54% rated this feature as "easy" and 34% as "awkward". The ratings for computer systems were slightly higher with 69% awarding a value of "easy" and 23% a value of "very easy", strongly suggesting that input time is not as great a problem as many recorders fear.

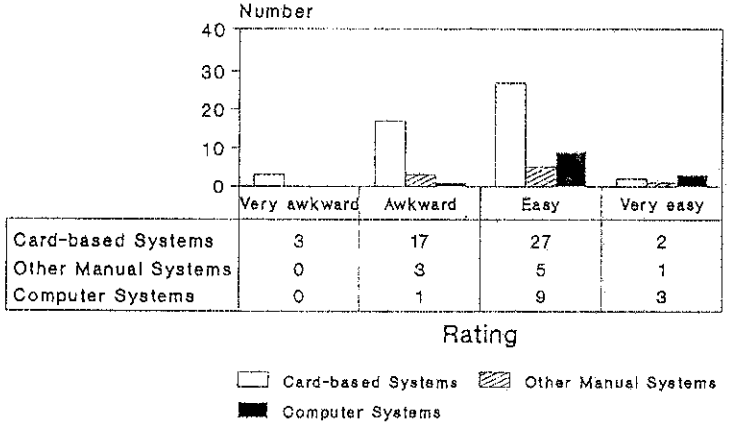
The main criticism of manual methods was the time it takes to sort records, and 78% rated this as "slow" or "very slow". On the other hand, this is where a computer system is most valuable - 85% rated their computer system as "fast" or "very fast". A couple of computer systems were rated as "slow", but these were not database systems specifically designed to manage large numbers of records efficiently.

The assessment of "other" manual systems was almost identical to card-based systems, except for a couple which appeared to perform very respectably. However, these were clubs where the annual submission of records is such that there are not any major organisational or retrieval problems.

With recorders receiving increasingly large numbers of records each year there are growing pressures on current manual systems, particularly on the management side. A computer system can become a real asset to a club and recorder, greatly reducing the time that needs to be devoted to the more mundane tasks of sorting and storing records.

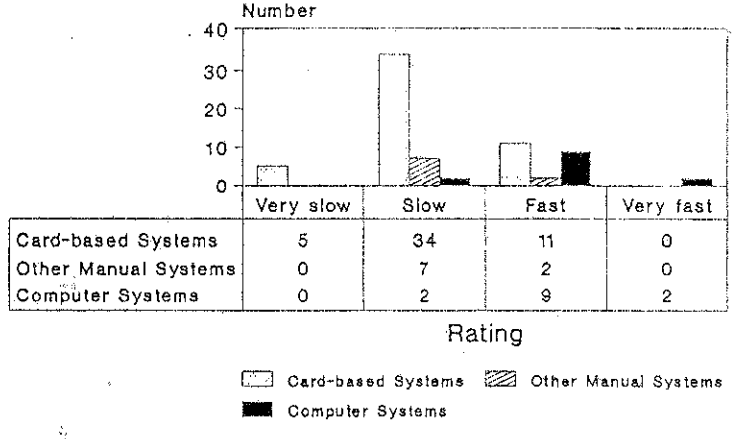
Fig.3a The performance ratings for each type of system.

RECORD MANAGEMENT



	Very awkward	Awkward	Easy	Very easy
Card-based Systems	3	17	27	2
Other Manual Systems	0	3	5	1
Computer Systems	0	1	9	3

RECORD SORTING

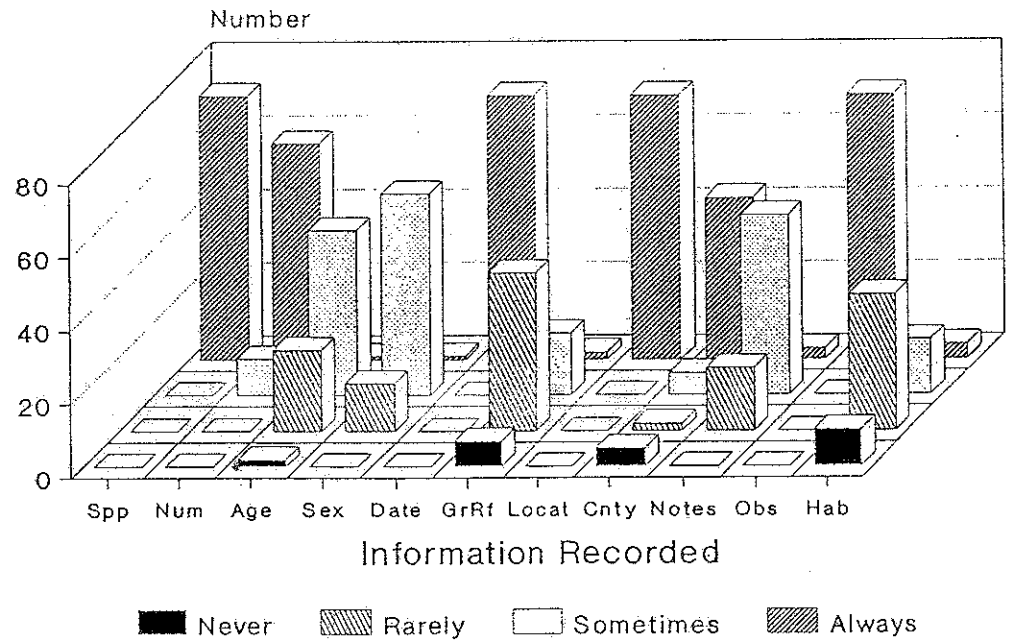


	Very slow	Slow	Fast	Very fast
Card-based Systems	5	34	11	0
Other Manual Systems	0	7	2	0
Computer Systems	0	2	9	2

3.2.2 Which values are recorded

A breakdown of how often each detail is recorded is shown in Fig.3b. Birdwatchers nearly always submit the species, number, date, and location, together with their name. Details of age and sex tend to accompany records of particular bird groups such as gulls and wildfowl, and notes will often be submitted along with interesting or unusual records. All these values should have there own separate space on an entry screen.

Fig.3b The frequency of submission of each detail in a record



Grid reference and habitat are rarely submitted and county, in most cases, is assumed. The grid reference is an essential piece of data, especially since it can give very precise information regarding the location and distribution of a species. To maintain the relation between large complexes of sites and smaller areas within that complex a site hierarchy is required. This way both fine detail of the exact occurrence of an observation and the relationship between geographically

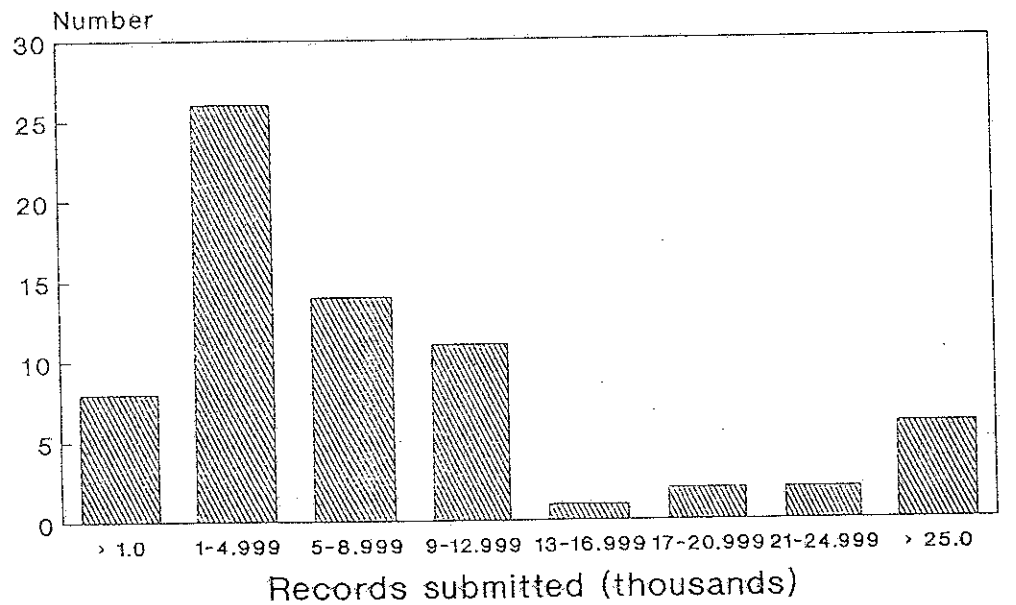
close sites can be maintained. To keep members informed of the sites registered in a system it would be useful to occasionally publish a complete list of all the sites in the database. Similarly, it may be useful to have an indication of habitat present at a site. These details could be stored in the site look-up file (look-up files are discussed in chapter 4).

In any system it is useful to be able to easily store all the details that may be needed at a later stage.

3.2.3 The number of records submitted to clubs annually

Most recorders had very little accurate idea as to how many records they receive annually, but from their estimates a large number of clubs seem to receive between 1,000 and 5,000 records (36%). An equally large number of clubs receive between 5,000 and 13,000 (35%), with a few at either extreme of the scale (Fig.3c).

Fig.3c The number of records clubs receive annually.



This is particularly useful for highlighting those clubs which are likely to benefit most from a computer system, and those which (because so few records are submitted) will gain the least.

Both Banbury Ornithological Society and Hertfordshire Natural History Society operate a computer system. These clubs receive between 7,000 and 9,000 records a year, and the recorder for each club has found their tasks much easier with the computer system.

3.2.4 The use of codes

Shorthand codes are being used by 20 clubs, and are particularly prevalent in clubs operating a computer system. Fortunately, most of these codes refer to simple observer or site abbreviations, as the emergence of countless species codes is something to be avoided.

Several clubs use the occasional species short-hand, while others use a complete set of species codes. Three of these clubs have adopted the existing BTO 2-letter code, but four have devised their own set. The recorder for Grampian uses his own 6-letter code, Hertfordshire Natural History Society and Leed's Birdwatchers each have their own 5-letter code. Cambridge Bird Club have extended the BTO 2-letter code to three characters to allow a '*' prefix followed by 2 letters to accommodate rarities/escapes; Eg. '*CW' = Chiloe Wigeon. Sorby Natural History Society are inputting records onto a computer in Rotherham museum running NCC's RECORDER, which supports the BTO 2-letter code.

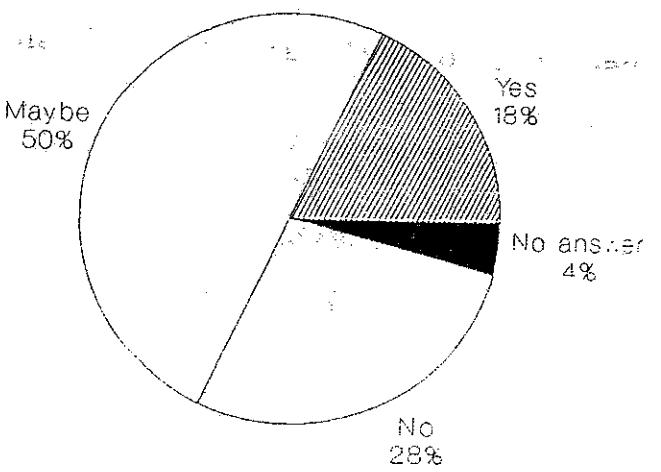
The use of short-hand codes is very useful in a computer system where they can greatly reduce typing time for details such as species and location. However, it is important that any code system is standardised, otherwise great confusion can arise.

3.2.5 Recording cards

About half of the clubs in the survey already have their own recording card. These are fairly simple species cards, with columns for the commonly submitted details - species, date, location and number. Some have combined number with notes to allow space for age and sex details. This covers what most birdwatchers will readily record and submit. A few provide a column for grid reference, while habitat is rarely catered for. One feature which many cards showed was the club's own logo.

The reaction to the possible development of a national card was not particularly positive; the results are shown in Fig.3d.

Fig.3d The reaction of clubs to the proposition of a standard national recording card.



Only 18% were in favour of the idea, with 28% firmly against (Fig.3d). A large number were undecided and if they could be

convinced of the merits of a standard recording card then there is a possibility of introducing a popular card.

A national recording card would probably provide a useful means of promoting standardisation, even if it was only used by a minority of clubs initially. This may be explored in more detail as time/staff become available.

3.2.6 Current uses of data and areas clubs would like to explore

Many bird clubs produce regular newsletters and/or an annual report. In addition to this, there is growing interest in other uses of their carefully collected and collated data and many clubs have expressed a wish to extend the applications of their data. In particular, with the current swing to "green issues" some 16 clubs would like to use their bird data to provide information in support of local conservation issues. Other clubs are keen to map the distributions, both breeding and passage, of birds throughout the county; seven clubs are part way through breeding atlas field work. There is also a general desire to be able to easily retrieve site data; something which is very difficult with a manual system. The value and feasibility of these projects is discussed in chapter 2.

Clubs are keen for a system that not only offers them the facilities to pursue these projects, but also reduces the time they need to devote to the more mundane tasks of cataloguing and sorting records. To begin to tackle these projects some improved management of the large data bank of records is needed, and a computer system would provide the necessary facilities.

3.2.7 Where more information is required

The areas where more information is required are listed below, along with the number of clubs requiring that information.

Benefits of a computer	27
Costs	33
Safe-guarding information	20
Technical advice	37
Graphics packages	1
What other clubs are doing	4
No information required	2

More information on every aspect of a computer system was required by 18 clubs. Other clubs singled out technical advice, costs of such a venture, and the potential benefits as areas they would welcome more information. A couple of clubs pointed out that it would be useful to hear about developments by other clubs, and there is great scope here for increasing the contact between clubs.

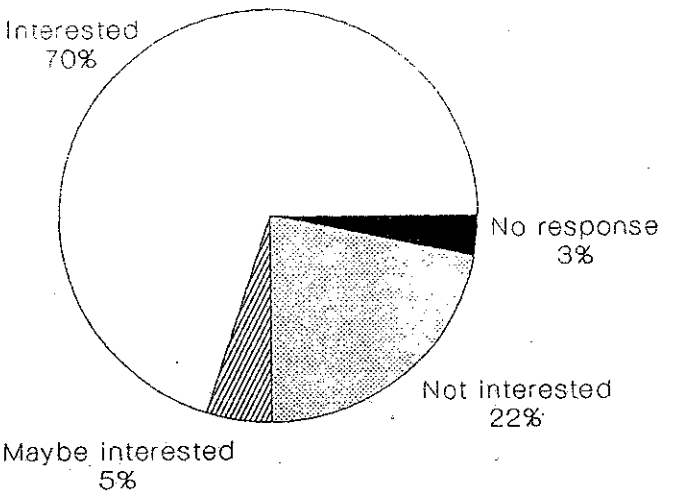
3.2.8 Views on computers

a) Operators of manual systems

Of those clubs using manual systems 70% indicated a strong interest in the concept of a computerised bird recording system. From the 22% who considered that a computer would not help their recording, most were clubs with a small annual submission of records, where the benefits of such a system would be minimal. Several other clubs were uncomfortable with

the idea of a computer handling bird records, particularly sensitive breeding records, and a couple of recorders admitted that they would probably retire in a few years and that any use of computers could wait until a younger recorder took over.

Fig.3e The degree of interest in computerisation of bird records shown by clubs currently operating a manual system.



One major problem with computers is the initial cost, and 25% considered that such a venture would be too expensive. Against this, 28% that felt they could afford the outlay. It is worth noting that several of the clubs who already operate a computer system managed to ease the "expense-hurdle" by stimulating financial support locally, and any club considering the purchase of a computer system may find it beneficial to approach local authorities/companies in an attempt to raise funds.

Problems were also predicted when a new recorder starts, although with support and guidance from his predecessor, any change over would be fairly smooth.

In most club set-ups any machine is likely to spend the majority of time at the recorder's home. In large counties, where there may be regional recorders, this will not be satisfactory; such difficulties will need to be addressed individually where they occur.

The survey highlighted the following areas of uncertainty regarding the capabilities of a computer system:

1) Data protection
There must be adequate facilities to recover from accidental erasure of data.

2) Documentation
Any package must be well documented

3) Input time
Input of records must be quick and simple (35% of manual operators cited this as a problem)

4) Sensitive records
All confidential information must be safe.

5) Submission of records
Any system must be able to cope with the different formats birdwatchers use to submit records

All of these could be catered for by a carefully designed and well presented system. For data protection a system should provide the facility to perform back-ups of data and programs. If these are carried out regularly then the effect of any accidental data loss is greatly reduced. If the computer develops a fault it is useful to have a system that can restore the information. All packages should be well documented and a clear, easy-to-read, manual is essential. There should also be a degree of on-line help in the form of simple messages and

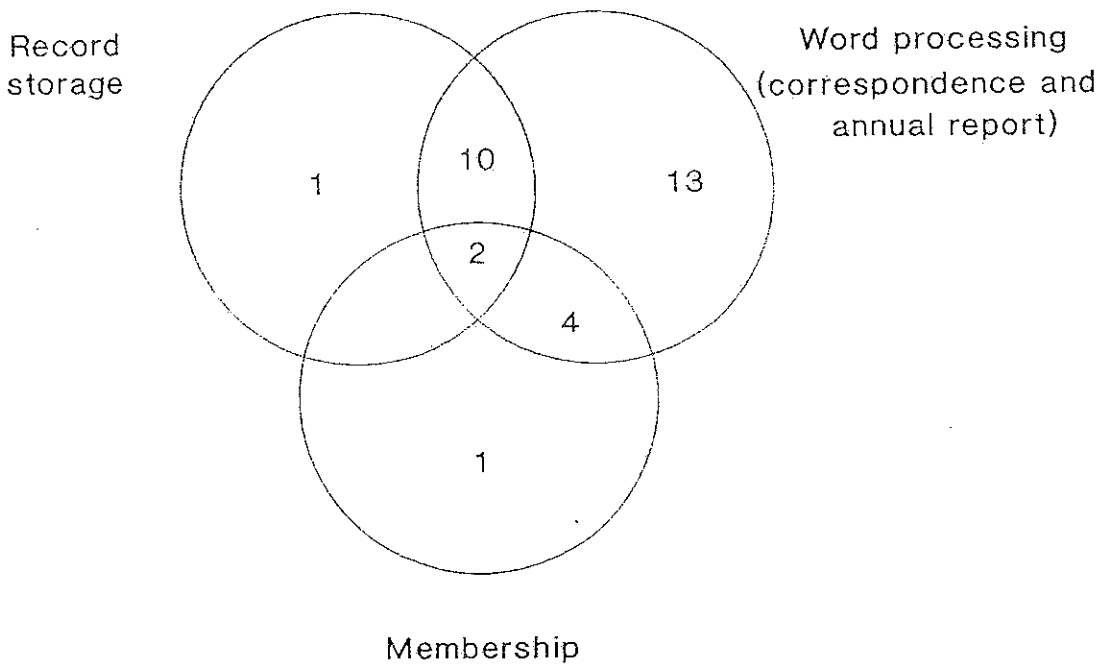
prompts that guide a user through the system while it is being used. Clearly designed screens will make entry of records simple, and the use of codes can decrease the entry time for details like species name and location. Safety of records can be achieved with a password system. Records in a standard format are easier to handle, but the relevant details can easily be extracted from any source and entered onto the system. If a breeding survey is being undertaken it would be useful to have a separate entry screen for tetrad data.

A system should be friendly and easy to use and also provide the necessary facilities to reduce the likelihood of problems to a minimum.

b) Computer users

Altogether 31 clubs are using computers. The different uses clubs make of their computer are illustrated in Fig.3f.

Fig.3f The uses to which clubs put their computer.



Twelve clubs store records on their machine, but many simply perform word processing functions: general correspondence, newsletters and annual report writing. Surprisingly, only seven clubs have membership details on their machine. One club sends the annual report to the printers on disk.

A range of machines are in use (table 3b), with many recorders using their own computer. Amstrad PCs are very popular, but there is also quite a range of other XT's and AT's.

Table 3b: Types of computer being used by bird clubs.

Amstrad PCW	Amstrad 1640	Other XT/AT	BBC	Other
4	9	11	4	3

Many clubs appear to be restricted by the type of computer they have, and although they would like to implement a database type system their hardware is preventing them from making such developments. This is particularly so for clubs using an Amstrad PCW or BBC. These computers are very good for tasks such as word processing, but they are unsuitable for handling large volumes of data in an efficient way.

Ten clubs are considering extending their use of computers and others are considering upgrading their computer. Several are searching for an easy to use and flexible database, and one recorder went as far to suggest that a national database structure should be sought.

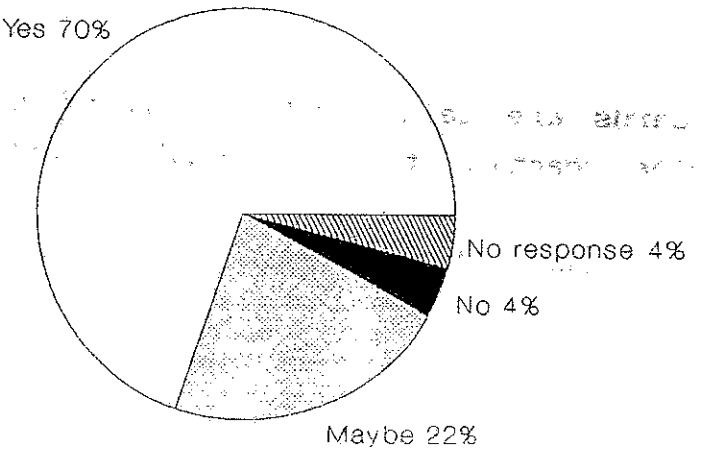
Computers have certainly shown their potential. Some clubs are

keen to explore areas of computerisation that have so far evaded them, and are particularly keen to find a system that efficiently manages large numbers of bird records.

c) Is computerisation of bird records a "good idea"?

From all the replies received only 4% considered that the involvement of computers in bird recording was not a good idea, with 70% positively in favour, providing that the system catered for all their needs and worries (as outlined above).

Fig.3g Do bird clubs consider that computerisation of bird records is a "good idea"?



This positive reaction towards the possible use of a computerised bird recording system indicates how seriously some clubs are considering such an application.

3.3 CONCLUSION

A large number of bird clubs and county recorders were contacted and sent a questionnaire to gauge their reactions to computers and to catalogue several aspects of their recording. The response was very encouraging, and many useful comments were made.

Currently, most bird clubs operate a manual filing system based around species cards. These systems cope adequately, but some tasks are rather time-consuming, particularly the sorting of records into date order. Such inconveniences are lost with a computer, and the small number of clubs that have a computer system for bird records seem very pleased with the way their system performs. There are no indications that input of records is a worry, and recorders operating a computerised system find the 7,000 - 9,000 records they receive annually easier to handle.

Recording cards are being used by around half of the clubs surveyed. The reaction to a national recording card was not very positive, with only 18% in favour of one. Although not essential, the use of a recording card obviously eases any record management and they also form an important foundation of any standardisation of recording.

Many clubs produce an annual report and in addition to this many are keen to explore a range of adventurous projects. To tackle these they need a system that increases their record handling efficiency, and a computer system would offer the necessary facilities.

Clubs and recorders generally have a fair idea as to the capabilities of a computer system but there are several fundamental worries, particularly about the safety of sensitive records, and what to do if a computer develops a serious fault. Such concerns can be reduced; a password system can be used to

protect sensitive records and a restore program can be used to recover lost data. The risks of losing data are greatly reduced if regular back-ups are made.

Only a handful of clubs are using computers to handle their bird records. Quite a few other clubs have computers which they predominantly use for word processing functions. Of these several are keen to find a suitable, easy to understand, database that they can implement to manage their bird records.

The survey has shown that several clubs are already successfully using computers to handle their bird records and smooth the running of their club and that there is a strong interest amongst other clubs in such developments. From all the clubs and recorders surveyed 70% thought that computerisation of bird records was the way forward.

4. BIOLOGICAL RECORDING AND COMPUTERS

Summary

Computer systems already play an important role in biological recording. The NCC and RSPB each have their own database system designed to handle information specific to their needs and the RSNC is considering the merits of such an application.

A few bird clubs have ventured into the realms of computers, and the interest and number is growing all the time. Banbury Ornithological Society, Hertfordshire Natural History Society and Sussex Ornithological Society all use a computer system to handle their members' casual observations, while clubs in Devon and Shropshire have programs to analyse their breeding atlas results.

These packages are examined and their use and value discussed.

4.1 INTRODUCTION

Many organisations and individuals store a great deal of what are essentially biological records, where a biological record consists of four types of information: what, where, when, and who said so. The "what" normally consists of a species name. The "where" is typically a location name, but may also be a grid reference. The "when" is usually a single date, but may be a period of stay, and the "who said so" is the recorder or even the reference to a published document. There is also a great deal of supplementary information, such as the scientific name of a species, its status, whether the site is a reserve, who the land owner is, and so on.

This sort of information is potentially useful in a variety of

ways (as discussed in chapter 2), and typically provides the answers for these two questions:

1) What species occur at a particular site?

2) Where is a particular species found?

The former question provides the basic information needed to assess the wildlife value of a site for the purposes of planning or conservation management, while the latter is used to map the distribution and abundance of a species, and with a good historical continuity of recording can be used to monitor population and status changes.

Only with the assistance of a computer system can all these projects be tackled efficiently and the full value of the data realised.

The most effective type of system to implement is a relational database. This is a system that has the ability to separate the data into several logically related files in which some of the information is represented by linkages (relations) between them.

It would be possible to implement a biological record database as a single "flat-file" with fields (spaces) for each detail typically found on a record; species name, site, date and so on. This would be very wasteful of space and effort and would be very difficult to maintain because every time information, such as a species name, was entered it would utilise a lot of space and take some time to type. Furthermore, there are likely to be frequent misspellings. The solution is to use a relational approach and put the species names, site names etc, into separate files, so that each is only stored once, and refer to them elsewhere by a "pointer" to the appropriate record. This not only saves a lot of space, but more importantly, ensures that information is consistent across the data set. All the entries of species name and site name can be

checked against a master list in the species or sites file. If no match is made then the entry is rejected. This consistency in data is vital, because when data is retrieved, say by species, only the records where the species name is identical to the supplied search name will be retrieved. For example, if a request was made for all the records of "SPOTTED FLYCATCHER", then all those records where the species entry was "SPOTTED FLYCATCHER" would be retrieved. However, any records with a slight mistake in the species name, for example "SPOTTED FLYCATHCER" would not be found and would in effect be lost. The file for species would also hold any additional information such as scientific name and Euring code. Note again that this information is only being stored once. Similar files would operate for sites and observers. As these files are used to check entries in the records file itself, they can be termed "look-up files". They serve an important role that cannot be over-stressed.

Many of the systems already being used by national organisations or bird clubs are based upon a relational database management system, and the value of such an approach is quite apparent.

4.2 BIOLOGICAL RECORDING PACKAGES

Several major organisations have developed computerised database systems to greatly increase their data handling efficiency. Stuart Ball (NCC) has developed a biological recording package, called RECORDER, which manages the full range of biological groups from plants and insects to birds and mammals. Stephen Coker has developed a similar package, called BIORECS. RSPB has a sites and species database which is to be upgraded by the software company ANTEC. These packages offer an interesting view of how some major organisations have moved into the computer age.

4.2.1 BIORECS

Designed and written by Stephen Coker (SC) (Appendix C).

BIORECS is an integrated recording and analysis package written in the high level language, Pascal. It will run on any IBM PC compatible micro-computer with a hard disc, and requires no additional software packages other than MS-DOS. The program, along with the general taxonomic files, occupies about 3 mega bytes of hard disk storage space.

With a retail price of around £300 for an institution and somewhere near to £60 for an amateur recorder, the system is well within the budget of most people interested in using computers to store biological records. Rather than concentrating computer power at the centre of an organisation, this makes the capabilities of a sophisticated recording package available to as many people as possible. There is the added advantage that the fragmentation of "input-effort" by using a number of computers, each controlled by a local "expert", eases the time consuming task of entering records.

Designed to operate at the vice-county level, it is envisaged that a range of recorders, for the various biological groups, would each have access to a machine. To maintain an up-to-date data set on each computer the records from each section would be periodically merged to form complete vice-county data sets. Vice-county data sets could themselves be combined to form regional or even national data sets.

With a large collection of data including many potentially sensitive records, several different levels of access are supported. These range from full access with the ability to add and edit records, down to restricted access with only those records with no rarity index available for viewing.

The system is operated via a series of simple menus. Although

some of the menu screens appear cluttered, even users with limited experience of computers should have little difficulty navigating their way round the system.

Input of species data is via tick screens based on facsimiles of BRC recording cards. The "record-cards" data set mainly comprises the following: what, where, when and by whom. Sets of data are processed and stored in Vice-county/10km square files. The main data set is for cards associated with a 6-figure grid reference but less precise records for tetrad/5km square and 10km squares are supported. The majority of data analysis is associated with 1km level records.

A separate sites file maintains descriptions of sites and their compartments, cross-linked to the main records file so that all "record-cards" in the 1km data set that refer to a particular site may be processed with that site.

Once the data have been input, interrogation of the data is achieved mainly via atlas functions. Atlases may be plotted to show the species distribution at the 1km square or the 10km square level for a vice county. Each dot on a map is cross-linked to the source record in the "record-card" data set so that it is possible to view the record associated with the dot on the map. As well as distribution maps, the atlas displays a histogram of a) the number of records made for that species for each week of the year and b) the number of records for each habitat type (habitat details can be input along with each record). A subsidiary plot at the 1km level is a habitat atlas showing the 1km distribution of habitat types which are associated with records in the "record-card" data set.

For the different biological groups maps can be produced to display the rarity index (species indices based on Red Data Book scores; i.e notable A, notable B and RDB) for each 1km square and the total number of species recorded in each 1km square. Together, these maps can be used to highlight potentially interesting and important sites.

In addition to the range of plotting functions available, simple tabular reports can be produced. These can be lists of all the records of a species or all the records for a site, and a range of parameters may be used to select records including taxonomic group, habitat and date.

BIORECS is well designed and user friendly. However, it does have a few problems. The most important of these is that it tends to "crash" after only a few mapping functions, causing obvious frustration to the user. This problem existed in November 1989, but may now have been corrected. It is worth stressing that SC has written BIORECS in his spare time and that if the package were to become widely used, it is unlikely that he could provide the support users would need.

4.2.2 NCC'S RECORDER

Written by Dr Stuart.G.Ball, NCC (Appendix C).

RECORDER is a database designed primarily to handle site-related species records. It was originally conceived to meet the needs of local biological record centres, but has grown into a system that could profitably be used in other types of organisations, especially those in the conservation movement and those involved in environmental management and planning.

The system is written in the database management system Advanced Revelation, which retails for around £400. Revelation provides an operating system and programming language designed for the development of database applications using the MS-DOS environment.

To run Advanced Revelation an IBM PC/XT or AT compatible micro-computer is required, with at least 512k of random access memory (although 640k is recommended) and a hard disk. The system files for Advanced Revelation occupy 3.5Mb of disk space

and RECORDER itself takes from 1.5Mb up to 15Mb depending on the taxonomic groups included in the species list. To be able to store a reasonable number of records, a minimum of a 40Mb hard disk is required. Although a machine with an 8086 or 8088 central processing unit will run the application, performance is considerably enhanced with an 80286 (or better) based machine. Version 3.0 or later of the MS-DOS operating system is also required.

The package is menu driven and makes extensive use of pop-ups and windows. Navigating round the system could cause the inexperienced user problems, and a period of training would be needed before users became confident.

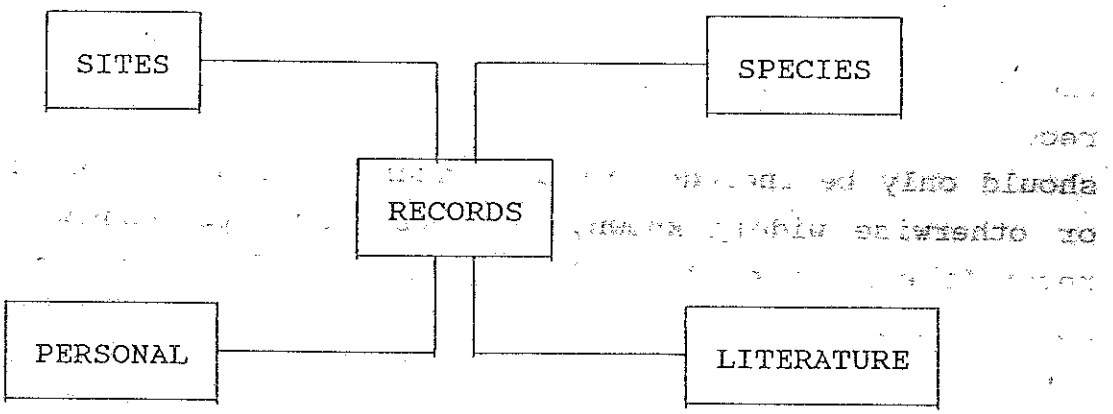
Extensive validation of input is made by checking entries against look-up files. In addition to checking the integrity of the data, the competence of the recorder is also stored. This is a field which stores whether: 1) there is no reason to doubt the record, 2) the record needs expert confirmation or 3) the record is knowm to be incorrect. Records of the last type should only be included in the database if they are published or otherwise widely known, and are there to acknowledge the record's existence. If such records are simply excluded there is a chance that someone may add them as good records thinking they were simply missed.

There are five main files storing information about the records, species, sites, recorder (personal) and literature. All contain a wealth of fields describing the relevant features and all are indexed and cross-linked where appropriate (Fig.4a).

A variety of reports providing information about a species are available including lists of all the records of a particular species, simple distribution maps at the 1km, 2km, 5km or 10km scales, and a histogram showing when during the year a species has been recorded.

All the records for a site, with the option to include sub-sites and/or associated sites can be presented in a tabular report. The user has complete control over what taxonomic groups to include and how they are sorted and there is the option to list all the literature associated with a site, and even all the observers who have submitted records for that site. Finally, tables can be produced which show the occurrence of a range of species in the 10km squares in a particular region. These can be used to indicate the presence/absence of a group of species, or the number of records for each species in each square.

Fig.4a Structure of RECORDER showing the main files.



Although the more common report requests are menu driven, to handle special requirements it is necessary for the user to become familiar with Advanced Revelation's "TCL" (The Command Level) and query language - R/list.

RECORDER is a very comprehensive package, covering the full scope of biological groups. Its sophistication allows it to manage a large collection of varied biological data, but it requires expensive hardware to perform efficiently and users are likely to need suitable tuition before they can use the system to its full potential.

4.2.3 Use of BIORECS and RECORDER

BIORECS is in use in most of the Welsh County Trusts. The suitability of RECORDER is being examined at various NCC offices, although it is not going to be used in their regional offices. The most likely use of the system is in Local Record Centres and County Trusts. Indeed, at the RSNC one of the main priorities of the Computer Support Unit (Senior Officer, Nik Longman) is a site and species recording package which will allow all the Trusts to store data in a uniform way and exchange with each other and RSNC centrally. For this, RSNC are investigating the feasibility of running RECORDER and have set up three pilot schemes in Gloucestershire, Lincolnshire and Somerset. In September, 1990, twelve more County Trusts will install RECORDER for a trial period.

Both BIORECS and RECORDER are well designed for their task as "Biological Recording Packages". They cover a range of biological groups, including some 15,000 invertebrates, but possibly do not cover birds in enough detail. From their very nature they are too general for bird clubs.

4.2.4 RSPB'S Sites and Species database

Since the late 1980's, RSPB has been developing their use of computers to handle and maintain the information they have on sites and species. The original programs were written "in-house" (in Revelation G, the fore-runner to Advanced Revelation) and although they were probably an improvement on any manual system that existed beforehand there were several fundamental flaws with the design. The main problem was that there was no relational structure, and this, coupled with the lack of indexing, made data retrievals very slow. Another worry was the lack of data validation, allowing incorrect records to become part of the data set.

The need for a well designed and efficient sites and species database has now been appreciated, and there are moves to update the current system. The software company ANTEC (Appendix C) will implement the upgrade, which is to be written in Advanced Revelation.

The proposed structure (Appendix D) is similar to the structure that clubs may adopt. There are four relationally linked files holding information on bird species, sites, sources, and the records themselves.

A well constructed database will give RSPB staff the facility to interrogate the organisation's databank in a quick and easy manner, thereby increasing the Society's efficiency.

4.3 TETRAD DISTRIBUTION DATA AND COMPUTERS

Many clubs are involved in producing a county breeding atlas based on the tetrad. The extensive amount of data involved in such a survey has prompted two organisations to turn to computers to assist in the maintenance and analysis of the results.

4.3.1 Devon Tetrad

The object of the Devon Breeding Bird Atlas Survey was to map, with a high degree of accuracy, the distribution of all the birds breeding in Devon. The survey took nine years of fieldwork involving some 300 amateur birdwatchers covering over 1,800 tetrads.

When the fieldwork came to an end the compilers were faced with the analysis of the data and the preparation of distribution maps. For other counties this had previously been done

manually, using Indian ink and stencils. With the data for Devon filling 14 lever arch files this would mean drawing some 84,000 dots! A manual procedure would be far too slow and they decided the answer was to enter all the information onto a computer and to write a suite of programs to handle the data. Furthermore, for each tetrad they input information on altitude, built up areas, woodland, rivers, and agricultural land class. This allowed the bird distributions to be related to various environmental factors.

The system was designed by David Price (Appendix C); the programs are written in BASIC and will operate on any IBM compatible PC with a hard disk running MS-DOS.

The programs cover both the inputting of the data (for each tetrad) as well as the mapping of the results, which can be easily adapted for use in other areas. Up to 140 different species can be recorded, and the individual breeding codes used for the survey can be specified. For each tetrad the name of the main place within it is held and up to 7 fields can be used to code habitat or other characteristics. These can be used for subsequent analyses of distribution patterns.

Survey data are entered by tetrad, with a visual proforma showing all species and the totals for that tetrad. Besides the standard distribution maps, and printouts of details for species and tetrads, it is possible to produce aggregated maps for up to 4 species, composite maps for 2 species (showing different symbols for each), maps of the distribution of the tetrad characteristics and to carry out relative density analyses of species against these tetrads. The mapping is based on a grid and requires a separate overlay of the county boundary.

The use of a computer and software written specially for tetrad data undoubtedly assisted the preparation of the "Tetrad Atlas Of The Breeding Birds Of Devon" and lead to a degree of analysis not possible with a manual system.

4.3.2 Shropshire Tetrad

TETRAD was commissioned by the Shropshire Ornithological Society in 1984 to store and process tetrad breeding bird data for its breeding bird survey. The package was originally written for the Shropshire Wildlife Trust's COMART; one of the first multi-user systems running CP/M which went out of date two years after its release, when it was overtaken by the IBM PC). TETRAD has now been translated into PC-compatible form and is commercially available at £74.75 from Oxford Mobius (Appendix C).

Before any records are entered the data set (survey area and species list) must be carefully defined as no alterations can be made once the data set is accepted by the program. This is potentially frustrating as a simple error in a definition, not detected until a late stage, could not be corrected without beginning again from scratch.

The survey area, which is typically a county, can be sub-divided into 10 regions and later analyses can be processed on either the whole survey area or by any pre-defined area. The species list can include up to 200 species (or pseudo-species) and each must be assigned a unique 2-letter code.

Input of tetrad information is quick and simple and a recorded level (0-4) is stored for each species in each tetrad of the user-defined area.

Output analyses can be as lists, maps, or statistical summaries for selected species, areas, or tetrads. As with the Devon package a separate overlay of the county boundary is needed.

Although the package handles tetrad data adequately, its design makes it very inflexible and great care and awareness is required when defining the data sets. The system will undoubtedly assist the production of the Shropshire Tetrad

Breeding Atlas, but it has limited applications for a bird club wishing to use computers.

4.3.3 Limitations of tetrad packages

Both the Devon package and Shropshire's Tetrad have been designed specifically to handle tetrad atlas data. Clubs that simply want a suite of programs to handle their tetrad atlas results may find one of these applications useful. However, clubs wishing to pursue a computer system are likely to want to handle all bird records, both tetrad breeding survey results and casual observations, in an integrated fashion. This is beyond the intention of either package.

4.4 BIRD CLUB COMPUTER SYSTEMS

A handful of clubs have a system for handling their bird records, both tetrad survey results and casual observations. Each is tailored to meet the particular needs of the recording area, but there is a large degree of common ground closely relating all the systems, particularly in the underlying file structure. They provide a valuable insight into what can be achieved at the county level without overstretching a club's budget or recorder's time. Three are examined below.

4.4.1 Banbury Ornithological Society (B.O.S.)

Under the guidance of Trevor Easterbrook (Appendix C) B.O.S were perhaps the first bird club to implement a computer system to manage their bird records. Using a Nimbus PC1 Research Machine they operate a database system written in Paradox, and pass data files to a spreadsheet, Excel, for analysis and

graphical representation.

All records are submitted on a standard recording card which caters for details of species, observer, date, flock size, grid reference (usually 4-figure), parish (used as a check on grid reference) and habitat, with space on the reverse for any additional notes. With the information supplied in this standard form, each record can be transferred onto the computer with the minimum of effort. To further ease the task of data entry, several members take turns at the keyboard.

Typical site and species reports can be produced, and further programs allow the graphic display and statistical analysis of the data. A specially designed program to draw a map of the B.O.S area can produce distribution details for particular species based on grid reference information drawn from record cards, together with physical details such as contours, rivers and roads.

To illustrate to members the value of their records the society regularly publish results, thereby encouraging continued submission of records.

B.O.S covers an area of only twelve 10 km squares. Each 1km square has been habitat mapped, and this allows some interesting analyses of species distribution with respect to habitat. The whole approach to recording is well organised and this, together with the computer power, enables the society to manage and analyse the area's bird records in an efficient manner and to provide facts in support of local conservation issues. The value of the club to local conservation is discussed in section 2.5.1.

4.4.2 Hertfordshire Natural History Society (H.N.H.S)

Until recently bird records in Hertfordshire, as in many other counties, were stored on species cards. Under the guidance of Ken Smith (Appendix C) the club now operates a computer system, written in dBASE III plus and run on an Amstrad PC1640.

The reasons behind this move were numerous, but mainly revolved around the following predicted advantages:

1) **Help in writing the annual report.** By considerably reducing the time it takes to collate and order records, a previously laborious task for the recorder now takes one evening. The printed systematic list provides the recorder with a complete, date ordered, account of all the year's records, and is invaluable when writing the annual report. One minor drawback is that it is rather tedious to pick out duplicate records, especially of long staying birds that are recorded by numerous observers during their stay.

2) **Records can be taken from any source.** All the relevant details can be extracted from any medium, be it a site card, a letter or even notes from a telephone conversation.

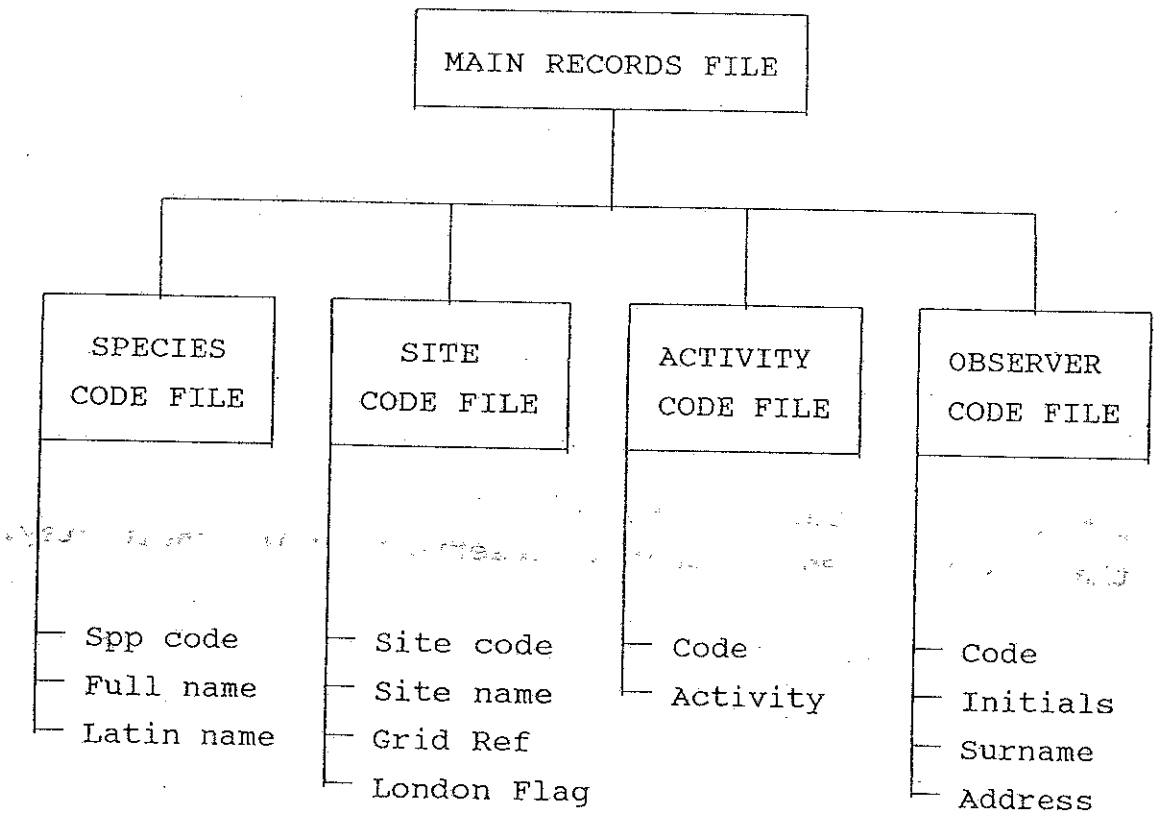
3) **Late records no longer cause a problem.** The final ordering of records is done just before the report is to be written.

4) **Data are now accessible for analysis.** Site and species information can be collated quickly, and are potentially valuable from a conservation view point.

The file structure (Fig.4b) is typical of what would be expected in a relational database. The main records file is

cross-linked to 4 files holding details about species, sites, activities, and people. These files are indexed in a variety of ways to allow rapid access of records and correct ordering of reports.

Fig.4b Outline file structure of the "H.N.H.S. System".



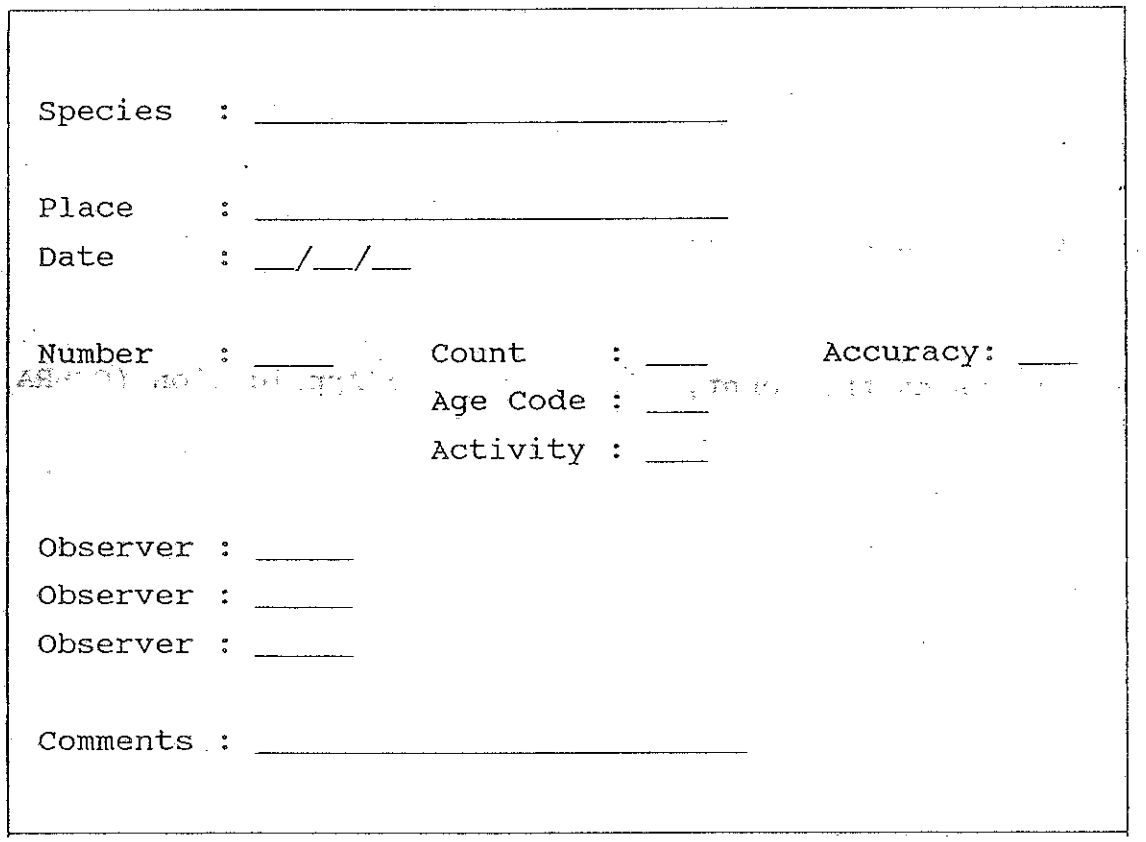
All interactions with the system are via user friendly menu screens.

The records entry screen (Fig.4c) has separate fields for all the commonly submitted details - species, place, date, count, accuracy, age code ,observer and general comments. There is no field for grid reference as this is catered for in the site file. Only the central point of each site is stored, and there is no site hierarchy, preventing records for related sites from being grouped. Although somewhat unsatisfactory, this simple

approach to sites is easy to implement.

Entry of records is quick and simple; there are shorthand codes for both species (5-letter) and sites, and the full name is echoed to check the code selection. To maintain high data integrity all entries of these fields are compared against values in the species and sites look-up files. If no match is made then the entry is rejected and the user is requested to enter the name again.

Fig.4c The records entry screen.



The report capabilities reflect the common needs of a bird club: a complete systematic list of all the records entered for that year, with species records in date order, site reports and lists of species requiring a description. A list of all the

records which overlap with the Greater London recording area is produced and passed on to the recorder for the London Natural History Society.

Although there are no plotting functions, this is an area that the club hopes to explore in the near future, with the primary aim of being able to produce county distribution maps.

The whole system is simple to use and easy to maintain. There are no requests for particular details which may deter birdwatchers from submitting records and no constraints of a standard recording card (although one obviously eases record handling). The system design allows birdwatchers to continue submitting their sightings without altering their way of recording, and allows the recorder to handle their records with greater efficiency.

4.4.3 Sussex Ornithological Society (S.O.S.)

S.O.S. are using the County Bird Recording Application (COBRA), which was developed by Peter Fraser (PF) of ANTEC (Appendix C). It has been written in the database management system Advanced Revelation (AREV) and is designed specifically for the management and analysis of bird records.

Sussex Ornithological Society have been using the package since January 1989, and have helped PF to smooth out some of the problems that are always present in an application early in its development.

The database package and application require a PC compatible XT or AT computer running MS-DOS (version 3.0 or later) with 640K of RAM and at least 20 Mb of disk space.

The structure revolves around five files. Four look-up files, holding coded information about sites, species, finders and

sources (Eg, group records like a sea-watch log), and the records themselves. These look-up files are vital to ensure high standards of data integrity. There is the facility to add to or alter these files. This may be to include the details of a new member in the finders file, or a new site in the sites file. For sites there is a system of parent and daughter sites. This enables small sites (daughters) to exist within larger complexes (parents), allowing fine detail to be maintained in the location field without losing the relationship of areas close together. An example of a sites entry in the sites files is shown in Fig.4d. All daughter sites of a parent site can be listed together.

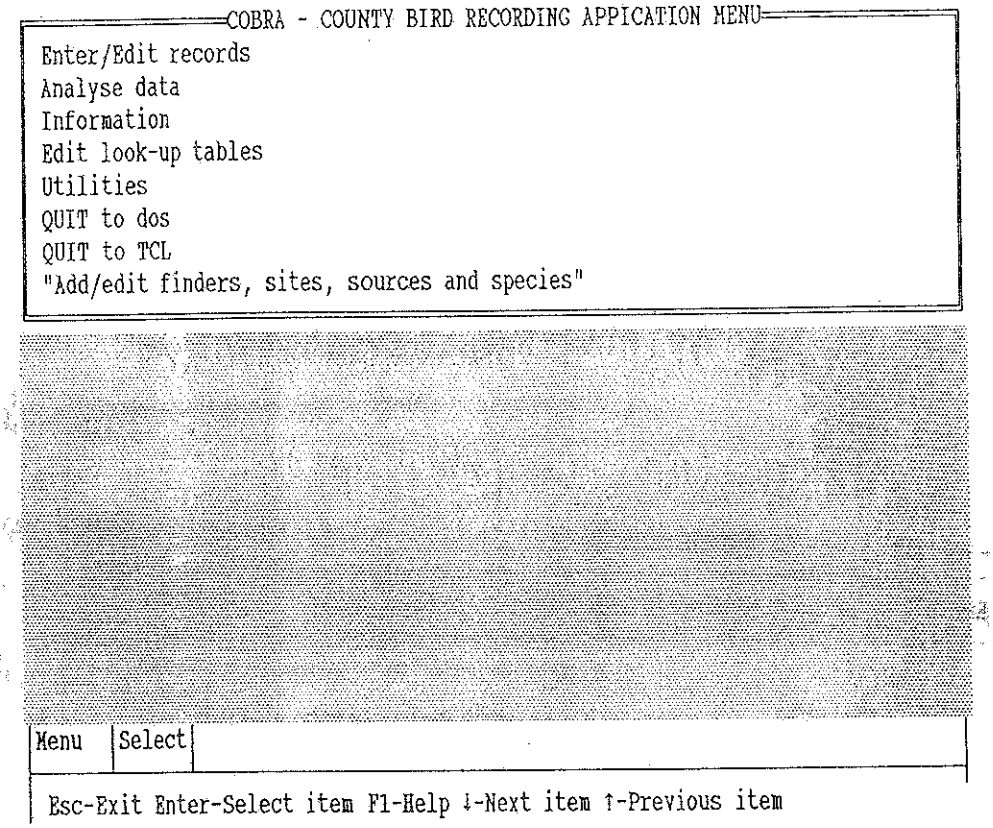
Fig.4d The site-edit screen for Pagham Harbour, showing the daughter sites.

```
                              SITE-EDIT

Site code:                          3        Region (E/W):  W
Site name:        PAGHAM HARBOUR.....
-------------------------------------------------------------------
Enter list of grid references associated with site here:     SZ8596
-------------------------------------------------------------  SZ8696
    Enter list of                                              SZ8796
 parent sites here:                                            SZ8896
                                                               SZ8795
 249  for new site                                             SZ8895
-------------------------------------------------------------  SZ8697
Daughter sites:                                                SZ8797
                                    69  records in             SZ8897
   2   SIDLESHAM FERRY                  database
  12   CHURCH NORTON                    for this
  13   PAGHAM LAGOON                    site.
  14   THE SEVERALS
  90   NORTH WALL PAGHAM HARBOUR
  94   FERRY LAGOON

|Window|Enter |Sv |      |      |SoftKeys|      |SITE.DIK     |3      |

|F1-Help CF2-Concept Help F2-Options F6-Softkeys F8-Clear F9-Save CF10-Filter
```

The program is simply operated through a series of menus listing available options; an example is shown in Fig.4e. The

user simply highlights the required option and presses return to execute the command. If any difficulty arises there are numerous help screens and occasional messages that guide the user.

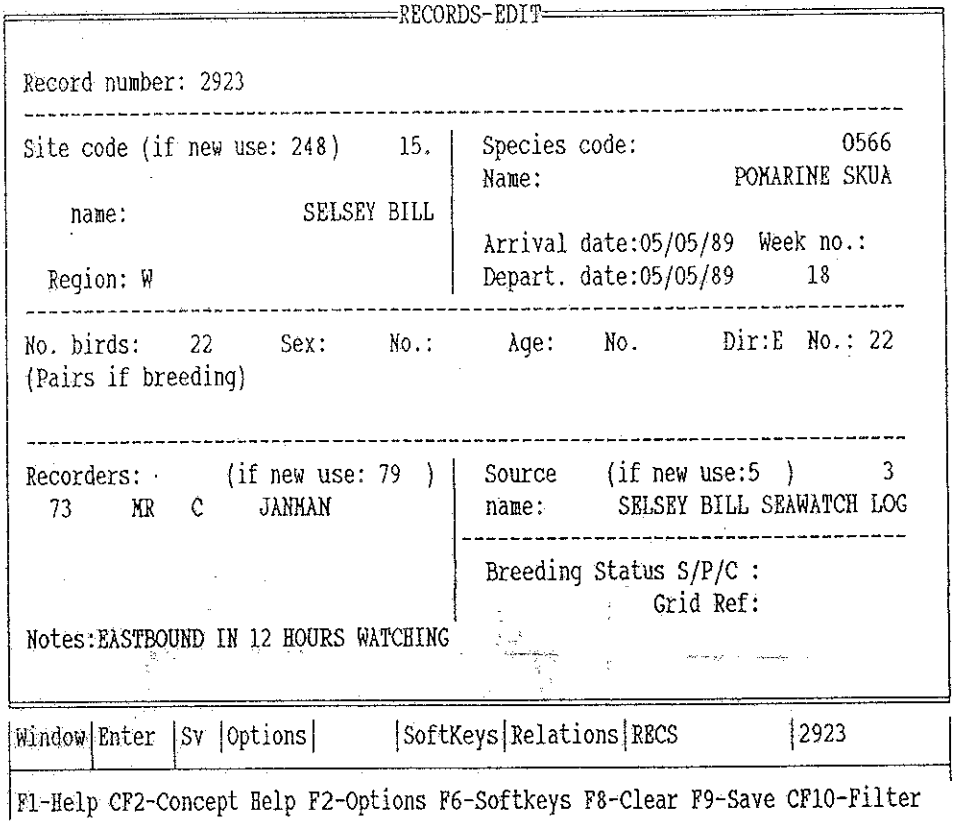
Fig.4e The first menu in COBRA.



Each record is entered through the main records entry window (Fig.4f). Although this may look rather complex, in reality the computer screen appears a lot less cluttered as the entered information stands out and the prompts for data are clear. The screen shows the information which can possibly be stored for each record, but for most records the site, species, date, number and recorder are the only elements. The entry of a record is quite fast as four parts can be entered by a simple code. The system supports two other screens for the entry of data. Batch entry, to enter a sequence of records at the same site on the same day (mainly for wader/wildfowl counts and good

migration watches), and tetrad entry, which enables information from survey work to be entered, in particular the atlas results for the new Sussex Breeding Atlas.

Fig.4f The window design for entering records into COBRA.



For breeding records there is a prompt for "Breeding Status" - (S)een, (P)ossibly/(P)robably breeding, or (C)onfirmed breeding, followed by a field for a 4- or 6-figure grid reference. Data stored in this area of the record are available for several methods of analysis including distribution mapping.

Should the need arise, there is the facility to edit and delete records.

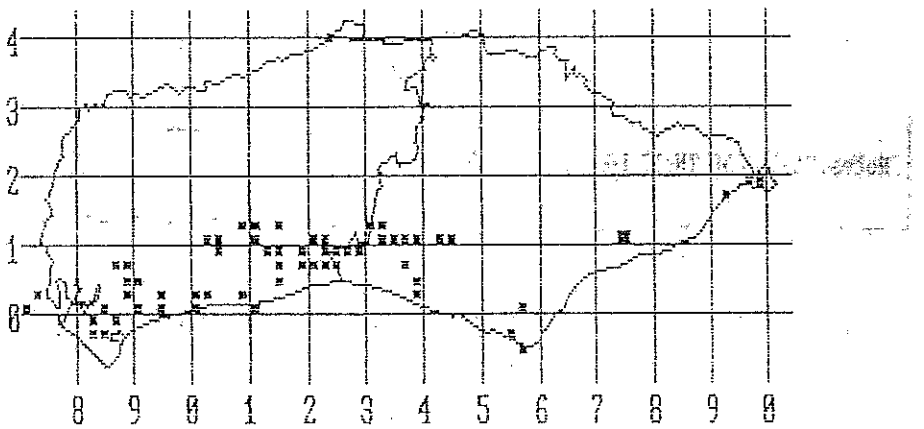
There are numerous options for analysing and extracting the information held in the computer. There is the ability to

select records of a species, for a range of dates or one site, and to then sort by date, month, week, or site. There are similar options for a site. Several lists can be produced, including a breeding list or a complete species list for a site, and a list of all the sites, species and recorders with the number of database records associated.

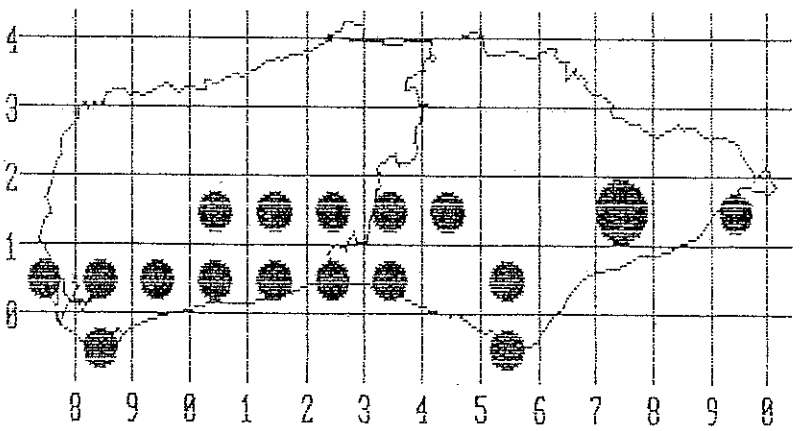
The application has been linked to a mapping programme, D-Map, written by Dr Alan Morton. This draws a distribution map of the species occurrence based on the grid references from both casual and tetrad records. There is the option to print breeding maps for any species based on 1 km, tetrad or 10 km squares, and examples are shown in Fig.4g.

Fig.4g Maps showing the breeding distribution of Corn Bunting.

Tetrad Map



10km Map



Finally, there is a utilities menu. Here, there are routines for backing-up both the data and the programmes, as well as a system to restore the information if the computer should develop a fault. The import section currently allows the import of records from dBASE III plus, or variable length ASCII files. There are potential problems with this, primarily revolving around validating the records before they become part of the main data set. It is particularly important that the fields for species and site are verified and that all the code sets are identical.

COBRA will deal with a maximum of 12,000 records for any one species or site. If records are well spread over sites and species this gives a limit of around 1,000,000 records. It is estimated that 100,000 records will occupy 15 Mb of disk space.

COBRA is a database specifically designed for the management and analysis of bird records. It is ideally suited to the needs of county bird recorders and societies involved in the production of annual reports or county avifaunas and allows the data to be handled efficiently and in a variety of ways, increasing the value of the bird data.

4.4.4 Other clubs using computers

As highlighted in the survey there are several other clubs using computers to varying degrees (see Table 4a).

4.5 PACKAGES FOR THE INDIVIDUAL

There are several packages on the market for the individual (Appendix E). These allow a birdwatcher to store and manage his own records on a computer and maintain various lists (Eg

year, and life). They have been written for a range of operating systems and computers including IBM compatible PC's, Apple Macintosh and Amstrad PCW.

Table 4a Bird Clubs using a computer to store their records.

Cambridge Bird Club
Clwyd Ornithological Society
Hertfordshire Natural History Society
Banbury Ornithological Society
Sorby Natural History Society
Leeds Birdwatchers

SOC - Argyll branch
Ayr branch
Moray/Nairn branch
Stirling branch

North East Scottish Bird Report

4.6 CONCLUSION

Biological records are potentially useful for a range of projects including conservation and monitoring. However, these records can only be efficiently utilised if the data are accessible from different perspectives. To achieve the required degree of flexibility and control over the data the most effective system to implement is a relational database. In such a set-up data are separated into several logically related files in which some of the information is represented by links between the files.

The large volumes of biological records that several of the

national organisations handle has prompted a couple of them to develop relational database systems. RSPB has a sites and species database which is being upgraded to Advanced Revelation by the company ANTEC. Stuart Ball (NCC) has developed a package, RECORDER, in the database management system Advanced Revelation. This is installed on a trial basis in three County Trusts, and there have been general inquiries from Local Record Centres and organisations like The National Rivers Authority. Stephen Coker has written a similar package, BIORECS, which is written in the high level language Pascal. RSNC are looking for a suitable system to install in the County Trusts, and RECORDER is likely to be favoured for this. These packages handle a range of biological groups from plants and insects to birds and mammals and are rather too general for bird clubs.

Some bird clubs have already started to use computers to varying degrees and for various projects. Two of these, those used by Devon Birdwatching and Preservation Society and Shropshire Ornithological Society, were specially designed to manage and analyse tetrad atlas results. They offer a useful method of management for tetrad results. However, as they were only designed to handle tetrad data their use for a bird club is perhaps limited.

A handful of clubs are using computerised database systems to handle both casual records and breeding atlas results in an integrated manner. The general relational design is very similar in each case, with a main records file linked to other files holding information about species, sites and observers. Banbury Ornithological Society, Hertfordshire Natural History Society have each developed their own system, while Sussex Ornithological Society is using a package developed by ANTEC.

All these packages give a good insight into what can be achieved and all strongly suggest that implementation of a computerised database is the way to achieve the required degree of record handling efficiency.

5. WHAT A COMPUTER SYSTEM CAN OFFER BIRD CLUBS

Summary

The facilities offered by a computer system are discussed with particular reference to the improvements in record handling and storage efficiency. Special attention is given to the various ways a database allows data to be retrieved and sorted, giving great flexibility in the use of data. A brief mention is made of other uses of a computer including simple word processing and desk top publishing.

5.1 INTRODUCTION

Computers are used in a range of applications and are particularly useful for managing large volumes of data, especially if those data need to be accessible for a number of different projects. Several national conservation organisations have developed computer systems to handle their biological data. This has enabled their data to be used for a range of projects including site safe-guard and for monitoring particular biological groups.

For a bird club, the primary benefits of a computer system revolve around a database structure to handle records. With this comes a whole range of report options not available with a manual system. The whole system can also alleviate some of the problems associated with cataloguing and sorting records.

A computer system offers a whole range of other applications, and there are a considerable number of different software packages available for personal computers. These range from simple word processors through to complicated statistical and graphical packages.

A computer system offers more than just a way of managing records more efficiently. It brings a host of facilities within the reach of a bird club, allowing the club to raise its profile and increase its efficiency.

5.2 BENEFITS OF A DATABASE SYSTEM

A database system improves the efficiency of record handling and makes it possible to retrieve data in a variety of forms to suit different needs.

5.2.1 Record handling improvements

A database system offers a vast improvement on the general cataloguing and management of records. No longer are there folders full of loose bits of paper. As the data arrives they can be input onto the computer and then manipulated as necessary.

The format of an observer's records are not too important (although a degree of uniformity certainly speeds up entry) as the relevant details can be extracted from any source. For instance, if an observer submits a site-visit type card there is no need to transfer the record for each species onto a species record card. Each record can simply be extracted from the card. There is no need to copy each species record onto its own species card. All the sorting can be done by the system at a later time. Furthermore, the site relationship of these records is maintained. If a breeding survey is being undertaken, then an entry screen can be designed specifically for tetrad results.

Some recorders may argue that inputting records is far more time-consuming than simply storing slips of paper. On the

surface this issue is open to debate, but when the benefits of input effort are evaluated any arguments diminish. By handling a record once in a careful manner that record becomes available for an array of purposes (as discussed in 5.2.2). Indeed, the value of the data are increased considerably because they can be handled efficiently.

5.2.2 Report capabilities

Perhaps the most powerful feature of a database system is the flexibility it offers with the stored data. With all the records entered onto a database system, the data can be manipulated and retrieved in a variety of forms.

When the annual report is being complied all the species cards need to be sorted and summarised. With a computer system the entire list of records for a year can be produced easily and quickly with the records for each species in date order. This makes it a simple task to review all the records for a species, and does away with the awkward task of repeatedly having to scan countless cards.

Information regarding species or sites can be collated easily. If details on the abundance and location of all the records of a particular species are required for a specific period of time it is possible to select all the records of a species for a range of dates or one site, and to sort by date, month, week or site.

For sites it is a simple task to generate a complete species list and breeding list. The collation of all the records for a single site, or group of related sites certainly has positive implications for conservation and site safe-guard. A list of all the sites, species, and recorders, with the number of database records associated could also be produced. A useful list for recorders could be a list of all the records requiring

a description.

The data can be used as input for mapping programs. Both casual and tetrad records can be used to map the species distribution in a county. Maps can be based on 1km, tetrad or 10km squares and with the inclusion of land type can give some interesting plots. Tetrad distribution maps can be generated easily, giving quick access to any interim results of a survey such as a county breeding atlas.

Many of these applications are discussed in chapter two, where the potential value of bird data was indicated, yet was inaccessible due to the way the records were stored. A database offers the flexibility to retrieve and present the data in a variety of forms, allowing the data to be used to its full potential.

5.2.3 Membership details

All the details of every member can be stored on the database. This could include their name, address and telephone number along with any details regarding their membership. If required it would be possible to produce a complete list of all members, or even all the members who have not paid their subscription.

When storing personal details consideration must be given to the Data Protection Act 1984. Organisations are exempt from the whole act "- where the data consist only of names and addresses and are used only for distribution purposes, providing those people have been asked if they object, and have not objected.". This consent could be incorporated in membership application forms or in a rule of the club.

5.3 WORD PROCESSING

Modern word processors come in a range of formats and prices, and offer an array of facilities. For bird clubs who regularly circulate a newsletter, or similar topical review of recent bird watching in the county, they offer the facility to quickly produce such a report. A newsletter can be easily updated and edited right up to when it is due for publication. If this is a monthly bulletin, all the records can be produced as a report from the database and then the more interesting ones extracted.

Word processors are useful for letter production, and any standard documents can be stored and used when necessary. For instance, a letter requesting full field notes for a county rarity or a simple acknowledgement letter.

When writing the annual report the whole report can easily be edited and checked. Sending a copy of the report to the printers on disk should reduce the costs.

5.4 DESK TOP PUBLISHING (DTP)

Desk top publishing offers a range of sophisticated features to present a report. They offer improved control over design, which becomes more attractive and flexible, and leads to a better use of space.

Sending an annual report to the printers on disk can greatly reduce printing costs. Although most printing companies seem to only accept disks from an Apple Macintosh, with a little searching it is possible to find ones that accept work from MS-DOS DTP applications.

DTP is an area that BTO is moving into in the near future, and bird clubs wishing to learn more about this area of computing

are invited to contact Paul Green (Head of Membership Unit) at Beech Grove.

5.5 CONCLUSION

Until recently, a species card type filing system has been the most popular method used to store and manage bird records. However, with increased pressures on time and a general wish to be able to utilise bird records more efficiently, an improved method is required. The most effective means of providing these facilities is a computerised database.

A computerised database alleviates some of the management problems associated with a typical manual system. There is no longer a need to store each observation on an appropriate species card. When a record card is received all the details can be easily transferred onto the computer system. To safe-guard data it is important to make regular back-ups onto diskette. There is also no need to sort the records, as this usually tedious operation is performed by the computer.

Such a system not only offers improvements in the general management of records, it also offers greater flexibility with the data and makes bird records available for a range of different applications. For instance, no longer is it an almost impossible task to retrieve all the records for a particular site. This type of data retrieval is reduced to a few key-strokes. Retrieval of all the records for a particular species is similarly performed by the system. Furthermore, other constraints can be put on the retrieved data, such as a date range and/or location. The production of a complete date ordered systematic list for a year greatly eases the task of reviewing and summarising the year's birdwatching. Instead of a table covered in a number of record cards, all the species records are in date order in one easy to study list.

With a mapping application it is possible to plot distribution maps of any species recorded in the area. These can be based on breeding survey results or casual observations or both combined.

The benefits of a computer system go beyond that of improved data handling facilities. A range of commercially available products bring several powerful applications within the reach of a bird club. Word processors make the production of a newsletter fairly simple and for those able to pursue more ambitious projects, DTP is a possibility.

A computer system offers a whole range of facilities that have real value to a bird club. Much of the tedium associated with cataloguing large numbers of records is reduced, but more importantly, the data themselves are stored in such a way that they can be used to their full potential (as discussed in chapter 2).

6. RECOMMENDATIONS

Summary

In earlier parts of the review bird clubs clearly expressed a general interest in the use of computer systems for managing bird records. Both the software and hardware necessary to implement a suitable system are discussed, with an indication of the cost of the various elements.

The need for a database application is stressed, and the suitability of the County Bird Recording Application (COBRA) developed by ANTEC is discussed. The problems associated with developing a new system are also examined.

A brief discussion of hardware is made, with emphasis on the type of computer system to install. Older personal computers (XTs and their clones) are advised against, as they are rather slow, while a 286 or 386SX model is suggested as much more suitable.

6.1 INTRODUCTION

The review in chapter two shows that bird club data are extremely valuable. They have many potential applications, particularly in the fields of conservation and research, but only if the data are easily accessible. The obvious way to make the data readily available for such a range of projects is to implement a database system.

Although a computer system is clearly the way to achieve a high degree of data handling efficiency, it is essential that any bird club considering the use of a computer system carefully defines and evaluates what it wants to gain before it implements one.

Many clubs are keen to extend the applications of their bird data, and 70% of clubs currently using a manual system are interested in the possibilities offered by a computerised approach (chapter three).

The use of a computer system to handle biological records is not a new venture. NCC and RSPB each have their own database systems to manage some of their biological records. RSNC have set up pilot schemes in three County Trusts to test the suitability of NCC's RECORDER package. Several bird clubs have recently started to take advantage of the facilities offered by a database system. The value of a computer system to those clubs who already operate one was demonstrated in chapter two. For instance, Banbury Ornithological Society, through the use of their computer system, manage to play an important role in local conservation. Their bird data, quickly collated with the computer system, have helped prevent the development of several ornithologically important sites. This is a role they could never have hoped to fulfil if they had to rely upon a manual species card based system.

The developments that have been made in "biological recording and computers" clearly indicate that a DATABASE SYSTEM is the most effective and efficient system to implement. It is equally clear that any system must be carefully designed otherwise enormous problems can develop. For instance, with no data checks the database can become littered with incorrect records, corrupting the integrity of the whole data set. Furthermore, without careful attention to design, data files can become unnecessarily large and data retrievals very slow.

To achieve high levels of standardisation it is important that the use of shorthand codes is carefully controlled. This is essential for species and sites, as different code sets make it extremely difficult to transfer data between different systems.

The software and hardware required to achieve a satisfactory

level of efficiency are discussed below, together with approximate costs.

6.2 SOFTWARE REQUIREMENTS

6.2.1 Operating system

In basic terms, the operating system is a suite of programs that supervise and control the operation of a computer. There are several different operating systems available, but the most suitable for a bird club application is Microsoft's Disk Operating System - MS-DOS. The latest version is 4.01. The popularity of MS-DOS for personal computers is reflected in the large range of software products available for computers running under this operating system.

MS-DOS is usually supplied along with a computer system, but may be a hidden extra for around £65.

6.2.2 Database system

There are a range of packages that fall into this category and the most important features to look for are a well presented and documented package that also offers good support to the user.

The systems examined in chapter four have all been developed (with the exception of BIORECS) in a database system, and they give a good insight as to the most effective design of an application for handling bird records. The ideal file structure is essentially the same as those illustrated in this chapter, with the main records file linked to several other files (look-up files) holding information about species, sites

and observers (for an example, see Fig 4b).

The County Bird Recording Application (COBRA), developed by ANTEC (Appendix C), is a very comprehensive application which offers all of the required functions. The system is reviewed in section 4.4.3. There are a few minor aspects that need attention, but overall this is a suitable package which is available for use now. The possibility of further developments involving BTO/RSPB and ANTEC are being explored.

Another option is the possibility of BTO and RSPB working together to develop software, which could then be supplied to bird clubs.

Alternatively, a bird club could write a similar application from scratch. There are numerous potential problems with this. Firstly, an organisation needs to find someone willing to develop such an application. Having found someone, there is then likely to be considerable time delay before a working version is ready for use, and then a further period of debug and tidying up. Further problems can arise if the designer moves away from the area, leaving no one qualified to maintain the system. It is far safer to rely upon a well established company that has the resources and expertise to support new users and explain any problems that may be encountered.

6.3 HARDWARE REQUIREMENTS

6.3.1 Personal Computer

There are an overwhelming range of personal computers available on the market that vary in performance and price. The more important features to pay attention to are the overall speed of the machine, disk access time, the amount of Random Access Memory (RAM) and the amount of storage space available.

There are several factors that contribute to the overall performance of a system, the most important of these being average disk access time and system clock speed.

Average disk access time is the time it takes the recording heads in the disk drive to move from one random location to another and obtain the start of the requested information; i.e, the time it takes to find where on the disk the required information has been stored. The figure is rated in milliseconds (ms) and despite the units small differences make significant differences in performance. An average access time of over 60ms is slow while around 30ms is quite fast.

The CPU speed or system clock speed is the basic timing signal that coordinates the movement of information between the CPU, memory and other devices. It is rated in megahertz (MHz), and is popularly banded about by vendors. Generally, the higher the system clock speed the faster the machine.

The system clock is a good approximation of the CPU's power. However, "wait state" can reduce performance. "Wait state" is when memory cannot offer its information as quickly as the CPU can retrieve the information. For each wait state, the CPU waits one system clock cycle for the information to become available. Generally, one wait state slows the potential performance by 8-12 percent.

The amount of RAM is important for the type of application being used. Several packages will only run with a minimum of 640k RAM.

At the lower end of the market there are what are called XTs. These were the first range of personal computers that were developed, and although they are cheaper than later models there are several reasons to avoid them. Firstly, they are rather slow. This relates to both overall performance of the machine's CPU, and disk access time. The XTs (CPU = 8088) top speed is generally 8MHz, although some of these can border

10MHz. For running an application like COBRA this is rather slow, and coupled with a disk access time of over 60ms then a user may find the machine rather sluggish, and frustrating to use at times.

The next generation of PCs were termed ATs (CPU = 286). Table 6a lists a range of 286-based computers, with an indication of their cost. The basic configuration for an AT (or AT compatible) is a step up from the XT, with faster processor, larger hard disks and more RAM. Bigger hard disks are not simply a luxury; they have faster response times and transfer data more rapidly. A few years ago a 40 Mb hard disk would have seemed excessive, but today it is a reasonable minimum. A 60ms response time is the absolute minimum acceptable, while a 28ms drive (or faster) is much more acceptable.

The top PC that clubs are likely to be able to afford is known as the 386. This will run at upto 33MHz, although a cut down version, the 386SX runs at 16MHz. This latter model is quite popular as it offers a quick machine at a competitive price when compared to a top of the range 286 model. Table 6b lists a range of 386SX-based computers, with an indication of their cost.

6.3.2 Screen Display

Quite simply the more money you part with, the more attractive the screen becomes.

A common display adaptor is the colour graphics adaptor (CGA) - this is the one to avoid if possible. It only uses a small number of dots to make up each character and so gives a fairly poor text display.

Table 6a The cost of a range of 286 based computers with a 40Mb hard disk (prices exclude VAT).

Make and Model	Clock speed (MHz)	Access time (ms)	Hercules mono £	VGA Mono £	VGA colour £
AMT Powermaster 212	12		1550		1975
AST Bravo/286	8	28	1600		2050
Commodore PC40 III	6/12	19		1699	1927
Compu Add 212	12		1134	1234	1434
Dell System 210	12.5	29		1299	1449
Elonex PC286 M	12	28		945	1145
Olivetti PCS 286	12			1145	1295
Opus PCIV 286	12	28	1199		1499
Tandon PCA/12sl	8/12		1249	1369	1644
Tulip AT Compact 3	12.5	27	1545	1545	1970
Viglen Vig III	8/16		1199		1549

Table 6b The cost of a range of 386SX based computers with a 40Mb hard disk (prices exclude VAT).

Make and Model	Clock speed (MHz)	Access time (ms)	Hercules mono £	VGA Mono £	VGA colour £
AMT Powermaster 316	16		1750		2175
AST Bravo/386SX	16	28	2245		2570
Commodore PC50 II	16			2368	2591
Compu Add 316s	16		1389	1489	1689
Dell System 316SX	16	29		1599	1749
Elonex PC386SX/B	16	28		1195	1395
Olivetti PC500	16	28		2595	2976
Opus PCSX	8/16	25	1299		1599
Tandon PCAs1/386SX	8/16	26	1699	1819	2094
Tulip SX Compact 2	16	29		2045	2375
Viglen Genie 3SX HD40	8/16			1159	1399

The best types of display to go for are Hercules, enhanced graphics adaptor (EGA) and video graphics adaptor (VGA). Hercules gives a good display, although only in monochrome. The EGA gives a good display in colour or monochrome. However, the VGA display is rapidly becoming the standard, and is offered in several resolutions. It gives an impressive colour display and a much improved monochrome display. The only disadvantage is that it costs more.

6.3.3 Printer

There are two main classes of printers - impact and non-impact. Non-impact printers, inkjets and laserjets, although they give excellent results, are very expensive. There are two sorts of impact printer; daisywheel and dot matrix. The former are rather slow and do not support graphics. The most suitable printer, offering great versatility, is a dot matrix printer. These range from 9-pin, at the lower end of the market, up to 24-pin. Table 6c shows a range of printers and their cost.

Quite simply, the more pins the higher the quality. A 9-pin is adequate, but if quality of presentation is important then it may be worth considering a more expensive 24-pin model.

With any printer it is worth having the option to use tractor feed paper and also single sheets. It is also important that the chosen printer is supported by any software that is likely to be used.

Table 6c The price of selected 9-pin dot matrix printers.

Make and Model	R.R.P £	Example dealer price £
Brother M1209	225	164
Epson LX400	173	125
Epson LX850	279	176
Panasonic KXP1180	245	155
Star LC10	199	122
Star LC10 II	222	149

Table 6d The price of selected 24-pin dot matrix printers.

Make and Model	R.R.P £	Example dealer price £
Brother M1224	330	235
Epson LQ400	260	190
Epson LQ550	399	256
Epson LQ850	695	415
Panasonic KXP1124	399	240
Panasonic KXP1695	525	385
Star LC24-10	299	195

R.R.P (Recommended retail price) and dealer price are both exclusive of VAT.

6.4 CONCLUSION

Before any considerations are given to the type of computer system to purchase, it is essential that a bird club clearly evaluates what it expects to gain from a computer system. Once it is clear that a computer system is the right step, then thoughts can be given to the type of software and hardware to purchase.

The software company ANTEC has developed a County Bird Recording Application (COBRA) which offers the full range of facilities a bird club is likely to require for efficiently managing their bird records. The proposed cost of COBRA and a runtime module of Advanced Revelation is £375 (or around £800 if a full copy of Revelation is required). The possibility of further developments involving BTO/RSPB and ANTEC are being pursued.

Another option being considered is the possibility of BTO and RSPB working together to develop software, which could then be supplied to bird clubs.

Discussions regarding these two options are continuing and the final recommendations for software will be sent to bird clubs in three to six months.

To sensibly run a sophisticated application requires a fast computer. The old XTs are too slow and, with the general decrease in the price of PCs, are no longer the bargain they once were. Ideally a 386SX is the model to buy, but equally suitable would be a good 286 model. These vary in price enormously, and from supplier to supplier. It is possible to find a 286 (with colour VGA) for under £1500 (excluding VAT), while a 386SX will cost several hundred more. If colour is not required (it is worth the extra), then the price can drop by a couple of hundred.

To round off the hardware a printer is needed. A very good 24-pin dot matrix can be found for around £300, while a 9-pin will sell for under £200.

When considering the virtues of such a venture, cost and value for money are often of prime concern. With regards to cost, it is worth noting that several of the clubs that already operate a computer system managed to ease the "expense-hurdle" by stimulating financial support locally, and any club considering the purchase of a computer system may find it beneficial to approach local authorities/companies in an attempt to raise funds. As for value for money, a bird club must assess its needs and evaluate whether or not a computer system will assist the running of the bird club and increase the value of their data. If the answer to these are "yes", then a computer system for managing bird records can be installed for between £1800 and £2500 (excluding VAT).

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I am grateful to several people for their kind permission to reproduce certain reports; to Kevin Bayes for RSPB's report on Rainham Marsh (appendix A1); to Trevor Easterbrook for the report prepared by Banbury Ornithological Society on Woodford Halse railway cuttings (appendix A3); to Ken Smith for the data on Northaw Great Wood (appendix A2); to Alan Stewart for the diagram showing the proposed structure of RSPB's sites and species database (appendix D).

Finally, many thanks are due to my colleagues at BTO for making my time there so enjoyable.

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APPENDICES

Appendix A1 : An example of an RSPB case objecting to the development of an ornithologically important site - Rainham marsh.

Appendix A2 : Bird data from H.N.H.S's computer system for Northaw Great Wood.

Appendix A3 : B.O.S's case objecting to the proposed development of Woodford Halse railway cuttings.

Appendix B : Sample Questionnaire.

Appendix C : Authors of software packages.

Appendix D : Proposed structure of RSPB's Sites and Species Database.

Appendix E : Software packages for the individual.

Appendix A1 : An example of an RSPB case objecting to the development of an ornithologically important site - Rainham marsh.

THE ROYAL SOCIETY FOR THE PROTECTION OF BIRDS

THE LODGE · SANDY · BEDFORDSHIRE · SG19 2DL · TEL: 0767 80551 · TELEX: 82469 RSPB · FAX: 0767 292365
THAMES AND CHILTERN OFFICE

8 January 1990

The Borough Planning Officer
London Borough of Havering
Technical Offices
Spilsby Road
ROMFORD
RM3 8UU

Dear Sir

PLANNING APPLICATIONS BY MCA ENTERPRISES INTERNATIONAL INC
APPLICATION TO LONDON BOROUGH OF HAVERING P2000.89
APPLICATION TO THURROCK BOROUGH COUNCIL THU/1100/89

Thank you for the opportunity to comment on the above applications. The Royal Society for the Protection of Birds (see Appendix 1) wishes to object to the above applications for following the reasons:

a) The development would destroy ~~300~~ 260 ha of a Site of Special Scientific Interest of national importance for wild birds.

b) The developments are contrary to local planning policy.

The arguments for refusing planning permission on the above applications are set out in more detail below.

CONTENTS

1 Nature Conservation

1.1 Both of the above applications impinge upon the Inner Thames Marshes Site of Special Scientific Interest. This is part of a national network of sites notified by the Nature Conservancy Council under Section 28 of the Wildlife and Countryside Act 1981 (as amended).

1.2 The Inner Thames Marshes SSSI, which includes Rainham, Wennington and Aveley Marshes represents a nationally important mosaic of habitats. The site comprises a major relic of low-lying grazing marsh, with a variety of grassland communities dissected by a network of fresh to brackish drains. The marshes are divided into two main blocks by an extensive series of bunded lagoons used for the disposal of silt dredgings. The discharge of silt and river water into the lagoons produces a changing complex of dry or flooded mudflats and developing saltmarsh. There are also areas of natural saltmarsh and intertidal mud along the Thames foreshore.

1.3 Almost 65% of Thames Estuary grazing marshes have been lost to housing, industry and agricultural improvement over the last 50 years (Ref. Thornton D. and Kite D.J.. Changes in the Extent of Thames Grazing Marshes. (in prep.)). These changes have meant that the characteristic wildlife of the marshes has become confined to increasingly smaller areas. The protection of wildlife on the remaining areas such as the Inner Thames Marshes is, consequently, increasingly important.

2 The Value of the Inner Thames Marshes SSSI for wild birds

2.1 The site holds important wintering bird populations. In particular, it regularly attracts one per cent or more of the total British wintering population of teal. Gadwall, shoveler, pintail and ruff all also occasionally reach one per cent of British wintering populations. The area also forms a regular winter feeding-site for birds of prey, particularly short-eared owl, hen harrier (both of which also roost on site) and merlin. (see Appendix 2).

2.2 The site holds an important assemblage of breeding bird species of lowland damp grassland and saltmarsh. (see Appendix 3).

2.3 The population of breeding redshank is important in the context of wet grassland in lowland England and especially so in the Inner Thames and Greater London area. This statement refers to the evaluations derived from the BTO/RSPB/NCC survey of breeding waders of lowland wet grassland 1982-83.

2.4 The site regularly supports one pair of breeding little ringed plover, a scarce species given special protection under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

2.5 The Inner Thames Marshes SSSI is a strategically important locality in the context of Greater London and the Thames Estuary for the wide range of species which use the site as a stop-over during migration.

2.6 The variety of bird species using the site, (over 170 species recorded within the last 20 years (D.J.Kite, pers. comm.)) is another important factor justifying the site's SSSI designation.

2.7 Short-eared owl, hen harrier, merlin and ruff are all listed in Annex 1 of the Council of the European Communities' Directive on the Conservation of Wild Birds (79/409/EEC). Under Article 4 of this directive Member states are required to prevent deterioration of the the habitats on which these birds depend. A further 8 species on the Annex 1 list are regular visitors to the SSSI.

3 Potential Impact of the Proposed Development

3.1 If implemented, these proposals will destroy over ~~300~~ 260 ha of a nationally important Site of Special Scientific Interest. This would be by far the largest loss of SSSI authorised by a planning permission on a site designated under the Wildlife and Countryside Act 1981 (as amended)

3.2 Development would mean the loss of about 70% of the current breeding, feeding and roosting habitat for the bird populations of the Inner Thames Marshes SSSI.

3.3 Whilst it is not possible to predict precisely the outcome of this loss, it is likely that the bird communities of the marshes would be severely disrupted. It is now widely recognised that habitat destruction of this nature does not merely force birds to shift to another site, but is generally implicated in decreases in population size.

3.4 Certain generalised outcomes can be predicted with reasonable certainty, as follows:

- Total destruction of the lagoon system will remove the majority of the habitat required by the wintering wildfowl and wader populations, that remaining, being the extremely restricted area of intertidal foreshore. This would mean almost total loss of the nationally important teal population.

- The breeding sites of the little ringed plover would be lost.

- Many of the marshland birds, in particular the scarcer birds of prey, are attracted to the site due to its large size, and the relatively undisturbed nature of some sections. It is likely that such a large loss of area would severely limit the use of the site by these birds.

- Much of the breeding wader population of Wennington Marsh would be lost either directly, under the development, or indirectly due to disturbance by the proximity of building.

- The site would no longer be nationally important for birds and there is considerable doubt over whether it would maintain the status of SSSI.

Appendix 2 Maximum Winter Counts for selected bird species

	1978/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88*	88/89*	89/90*
Teal	4000	2000	3000	2000	1800	900	3000	500	500	600	400	1500
Gadwall	58	4	2	9	2	4	50	-	-	-	-	-
Pintail	300	130	150	170	134	35	120+	-	-	-	-	-
Shoveler	70	200	300	40	32	40	40	-	-	-	-	-
Hen harrier	2	1	3	4	2	4	3	4	4	4	2 (5)	1(2)
Ruff	30	50	43	37	20	10	10	11	12	6	4	-
Short-eared owl	14	6	6	5	15	5	10	17	6	7	12	12

Counts meeting the qualifying level for national importance are underlined (see below).
() counts requiring confirmation
- no data available
* data based on a more limited source of records.

Thresholds for national significance are as follows

Teal	1000
Gadwall	50
Pintail	250
Shoveler	90
Ruff	50

Appendix 3

Bird populations of lowland damp grassland and saltmarsh breeding on the Inner Thames Marshes SSSI
(Data based on a Common Bird Census carried out in 1986)

Species	No. of Pairs	Lowland damp Grassland	Saltmarsh
Shelduck	4	X	X
Teal	2	X	
Shoveler	1	X	
Ringed plover	4		X
Lapwing	15	X	X
Redshank	12	X	X
Short-eared owl	1	X	X
Yellow wagtail	14	X	
Whinchat	2	X	X
Stonechat	3		X
Sedge warbler	24	X	X
Linnet	17		X
Reed bunting	140	X	X
Corn bunting	4		X

These are the species which are considered to be most important when assessing the bird communities of these particular habitats.

X = regularly occurs in this bird community.

Other important breeding species include little ringed plover, and possibly ruff (may have bred in 1989) both of which species are specially protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

In the context of the Inner Thames Marshes SSSI, the breeding density of reed warblers is also notable (172 pairs 1986).

Appendix A2 : Bird data from H.N.H.S's computer system for Northaw Great Wood.

Records for 1988

Species	DD/MM/YY	Count	Age	Act	Observers
Crossbill	10/05/88	9			SWIL
Green Wodpecker	23/10/88	4			SMUR
Marsh Tit	00/02/88+	4			SMUR
	no date				
Marsh Tit	23/10/88	10			SMUR
Nightingale	07/05/88	1		S	CHER
Nightingale	00/06/88	1			NWIL
Sparrowhawk	07/05/88	2			AOSB
Tree Pipit	07/05/88	2		S	AOSB
Tree Pipit	00/07/88	3M			SWIL
	(no dates - presumably breeding)				
Willow Tit	07/05/88	2			CHER
	seen visiting nest site				
Willow Tit	07/05/88	1			AOSB

Records for 1989

Species	DD/MM/YY	Count	Age	Act	Observers
Cuckoo	17/05/89	1			SMUR
Goldcrest	29/01/89+	4			MGUR
Great Spotted Woodpecker	29/01/89	1			MGUR
Hobby	14/05/89	2			PLAM
	at north boundary				
Lesser Spotted Woodpecker	14/05/89	1M			PLAM
Lesser Spotted Woodpecker	26/11/89	1			SBAN
Marsh Tit	29/01/89+	5			MGUR
Marsh Tit	14/05/89	1PR		D	PLAM
Nuthatch	29/01/89	3			MGUR
Spotted Flycatcher	29/05/89	1			MGUR
Tawny Owl	14/05/89	1			PLAM
Treecreeper	29/01/89	1			MGUR
Tree Pipit	07/05/89	2			SMUR
Tree Pipit	14/05/89	4			PLAM
Tree Pipit	21/05/89	1M			SWAT
Tree Pipit	29/05/89	1M			MGUR
Woodcock	27/05/89+	1			SMUR
Wood Warbler	14/05/89	1M			PLAM

Appendix A3 : B.O.S's case objecting to the proposed development of Woodford Halse railway cuttings.

WOODFORD HALSE RAILWAY CUTTINGS (SP540518)

A proposed infill refuse site for the Northamptonshire County Council.

The following report contains a description of the habitat and the wildlife to be found in the old railway cutting at Woodford Halse where tipping of refuse is to be proposed by the Northamptonshire County Council.

It has been compiled by members of the Banbury Ornithological Society living locally and the findings are endorsed by the full committee and its membership.

A.J.Nash

Conservation Officer (B.O.S.)

THE SITE AND HABITAT

The site is marked on the accompanied map, (Appendix I) within the area outlined in red, then further sub-divided by shading to form three relevant areas.

The area lies at approximately 150 metres above mean sea level, and being wholly cuttings which basically form a triangle of land just to the south of the former site of Woodford Station and sidings.

The cuttings took four years to excavate prior to the opening of the railway in 1898, making some nearly one hundred years old. They form a junction of the Banbury-Towcester line and The Great Central Line.

After the last train ran, in 1966 the track was immediately taken up and the area left undisturbed.

AREA A

The Great Central Line, shaded green on Appendix I.

This cutting is the deepest, longest and probably widest, running along a north/west-south east direction for C 1000 metres.

To the south of the Eydon Road Bridge it is fairly steep sided and reasonably sheltered with dense scrub growth at the top becoming open scrub, then grassland at the bottom.

The centre is flat and very sparsely vegetated.

This area has notable flower species, Common Milkwort, Cowslip, Grass Vetchling and Woolly Thistle.

The scrub growth provides safe breeding areas for migrant bird species, Turtle Dove, Common and Lesser Whitethroats (particularly abundant), Garden Warbler and Tree Pipit, whilst being important for resident species, Green Woodpecker, Willow Tit, Linnet.

Notable butterfly species recorded on this stretch in goods numbers are Small Skipper and Marbled White.

North of the Eydon Road Bridge the cutting opens out towards the site of the old station. At the base of the cutting on the western side is an area which lies wet for much of the year, here under a stand of Sallow Common Twayblade is colonising amongst the abundant Spotted Orchids and Marsh Thistles. The centre of the line is sparsely vegetated but alongthe margins Yellow Rattle, Quaking Grass and Marjoram can be found.

Bird species differ here from south of Eydon Road Bridge area because the habitat is more exposed and the scrub growth less dense, Whinchat, Stonechat and Meadow Pipit have all been recorded breeding here. (All three species are uncommon breeders on a County basis).

There are good supplies of winter foods for seed eaters, Goldfinch, Linnet and Redpoll, occasionally in flocks of very substantial numbers.

AREA B

The Banbury-Great Central South and Towcester junctions, shaded blue on Appendix I.

This area is made up of two cuttings running east-south-east and south east.

From the western end near Mr. Coulson's farm, which lies at the same level as the surrounding pastures, the cuttings get progressively deeper and on the eastern side of the road bridge, becomes very sheltered.

Along the ridges Hawthorn and Bramble have colonised, becoming quite dense in places and forming excellent breeding habitat for Blackcap, Lesser Whitethroat, Long-Tailed Tit, Turtle Dove, and also provides essential supplies of berries to winter visitors, Redwing and Fieldfare.

Lower down the banks there is a profusion of flowers in the spring and early summer. On the south facing slopes Bee Orchids (40 spikes 1983) can be found, while more generally distributed are Twayblade and Common Spotted Orchid. Cowslips are abundant whilst Common Milkwort and Quaking Grass are present.

AREA C

Running in a north easterly direction from Mr. Coulson's farm to join the Great Central Line, shaded yellow on Appendix 1.

This cutting has more gently sloping sides and is more heavily grazed during the summer than the other cuttings, but retains a scrub growth of Hawthorn and Bramble.

It is an important area throughout the year for the Green Woodpecker which feed on the ant colonies (for which there are many), and as a breeding site for Linnets and Lesser Whitethroats.

Amongst the rocky drainage channels Meadow Saxifrage can be found, a species of plant fast disappearing nationally.

This cutting also appears to have a very good population of Small Copper Butterflies.

CONCLUSIONS

This area of land has an excellent diversity of flora and fauna which has taken many years to develop, it is very important in the local context of a rapidly disappearing habitat type due to modern farming methods which do not include retention of grassland scrub in their progress programme.

Over 20 species of grass have been recorded here together with many other plants indicative of undisturbed grassland, some becoming very uncommon e.g. Meadow Saxifrage, Bee Orchid. These plants provide an abundant food source for the large invertebrate population, which in turn feed a very healthy and stable bird population, including some species of residents and summer visitors in national decline.

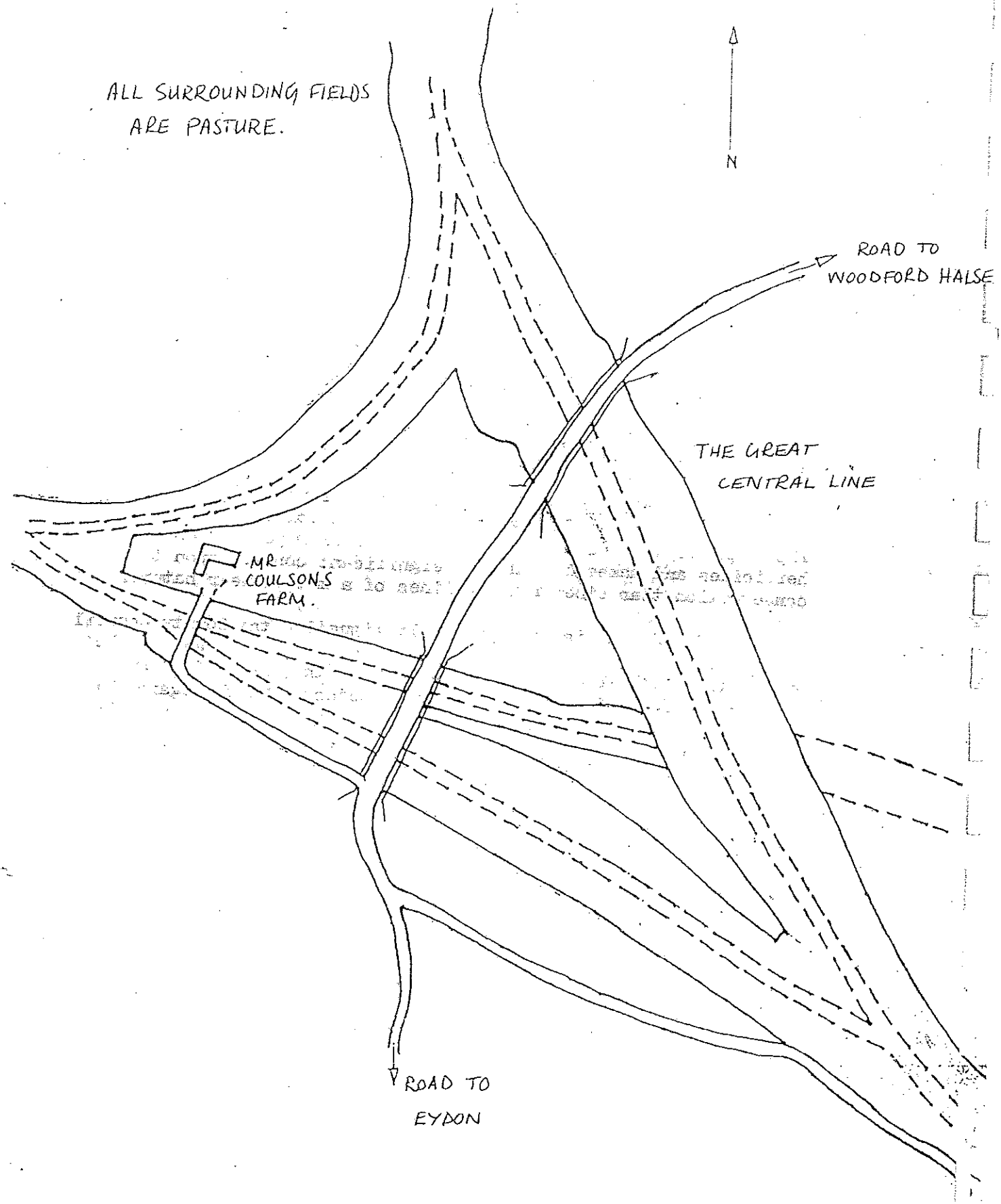
With major changes taking place on surrounding farmland e.g. drainage, loss of hedgerow, the area involved makes an important ecological oasis, which is free from pesticides and herbicides and makes a much more significant contribution to conservation than other railway lines of a more linear nature.

The B.O.S. realise the difficult situation the County Council are in, in trying to find a suitable site for waste disposal, but due to the wildlife value of this area and the pleasure it gives to so many of our local people we must object strongly against the area being used as a waste tip and suggest the use of a suitable alternative site such as Charwelton cutting/Catesby Tunnel IF it has to be a local one.

M.J. Adkins
A.J. Balbi
A.J. Nash

FOR BANBURY ORNITHOLOGICAL SOCIETY

APPENDIX I SKETCH MAP OF SITE, NOT TO SCALE.



APPENDIX II

List of bird species recorded from the proposed land infill site.

* Denotes species know to have bred.

The site is especially important either as feeding ground or breeding area for species underlined.

	Grey Heron		Collared Dove
	Canada Goose	*	Turtle Dove
	Mallard	*	Cuckoo
	Teal		Short Eared Owl
*	Sparrowhawk		Tawny Owl
	Buzzard	*	Little Owl
	Peregrine	*	Red Legged Partridge
*	Hobby	*	Grey Partridge
	Merlin	*	Pheasant
*	Kestrel		Moorhen
	Whimbrel	*	Little Ringed Plover
	Woodcock		Golden Plover
	Snipe	*	Lapwing
	Jack Snipe		Spotted Redshank
	Black-Headed Gull		Greenshank
	Lesser Black Backed Gull		Green Sandpiper
	Common Gull		Curlew
	Great Black Backed Gull		Swift
	Herring Gull	*	Green Woodpecker
*	Woodpigeon	*	Great Spotted Woodpecker
*	Stock Dove	*	Lesser Spotted Woodpecker
*	Song Thrush	*	Starling
*	Mistle Thrush		Brambling

Appendix B : Sample questionnaire.

BTO/BIRD CLUBS PARTNERSHIP COMPUTER REVIEW QUESTIONNAIRE

NAME:

CLUB/ORGANISATION

CONTACT ADDRESS

Answers represent the views of : Recorder
Recording Committee
Club Committee
Other (please explain)

Thankyou for finding the time to complete this questionnaire.

Most of the questions have ready supplied answers, so please simply circle the appropriate response.
Where a box is provided, simply place a tick in the box beside the appropriate response(s).

1) RECORDING

a) How do you store and process records?

☐ Manually (card-system) ☐ By computer ☐ Other

Please give brief details:

b) Indicate how often you receive the following information by inserting: A - always, S - sometimes, R - rarely, N - never. (please add any not listed)

Species ...	Number ...	Age ...	Sex ...
Date ...	County ...	Location ...	Grid Ref ...
Habitat ...	Notes ...	Observer ...	

c) Do you receive details of the count unit (eg, pairs) ...
(again use A, S, R, or N) type (eg monthly max) ...
accuracy (eg +/-100) ...

d) Do you use any codes or shorthands?..... Yes No

(if yes, please specify the information you code and the code you use: eg - species, BTO 2-letter code)

e) How many records do you process in a year? .....

f) Do you find the process of record keeping....

very-awkward awkward easy very-easy

g) Do you find that sorting the records is....

very-slow slow fast very-fast

2) RECORDING CARDS

a) Do you use a standard recording card?..... Yes No
(if yes, please attach a copy)

b) Do you feel that a standard national recording card would be useful?..... Yes Maybe No

3) USE OF DATA

a) What is currently produced from the data?

- ☐ Newsletter/round-up
- ☐ Annual Report
- ☐ Atlas of breeding birds
- ☐ Other (please specify)

b) What would you ideally like to do with the data?

4) OPERATORS OF MANUAL RECORDING SYSTEM

a) Are you interested in computerisation of bird records?..... Yes No

b) Are any changes planned in your recording system?..... Yes No
(please give details)

c) Do you feel that computerisation would be too expensive to pursue?..... Yes No Unsure-of cost

d) Do you feel that inputting of records into a computer will occupy too much time?..... Yes No Don't know

5) COMPUTER USERS

a) Hardware - Machine (make) :
(model) :
Disk drive size :

Hard Disk (?) : Capacity: mb

Printer (make) :
(model) :

b) Software - Operating system (eg MS-DOS) :
Database management system :
Word processor :
Other (please specify) :

c) What do you use your computer for?

- ☐ Membership
- ☐ Record storing
- ☐ Breeding survey
- ☐ Annual report writing
- ☐ Correspondence
- ☐ Other (please specify)

d) Have you found computers useful?..... Yes Some-areas No

Comments:

e) If your system is not fully computerised, are you considering extending your use of computers?

..... Yes No

Comments:

6) FUTURE DEVELOPMENTS

a) In what areas are you lacking information?

(I do not intend to provide information from this questionnaire at this stage: rather, this is to give me an indication of where to concentrate my efforts.)

- ☐ Technical advice
- ☐ Costs
- ☐ Benefits of a computer
  (eg retrieval and report capabilities)
- ☐ Safe-guarding and backing-up information
- ☐ Other (please specify)

b) Do you think that computerisation of bird records is a good idea?..... Yes Maybe No

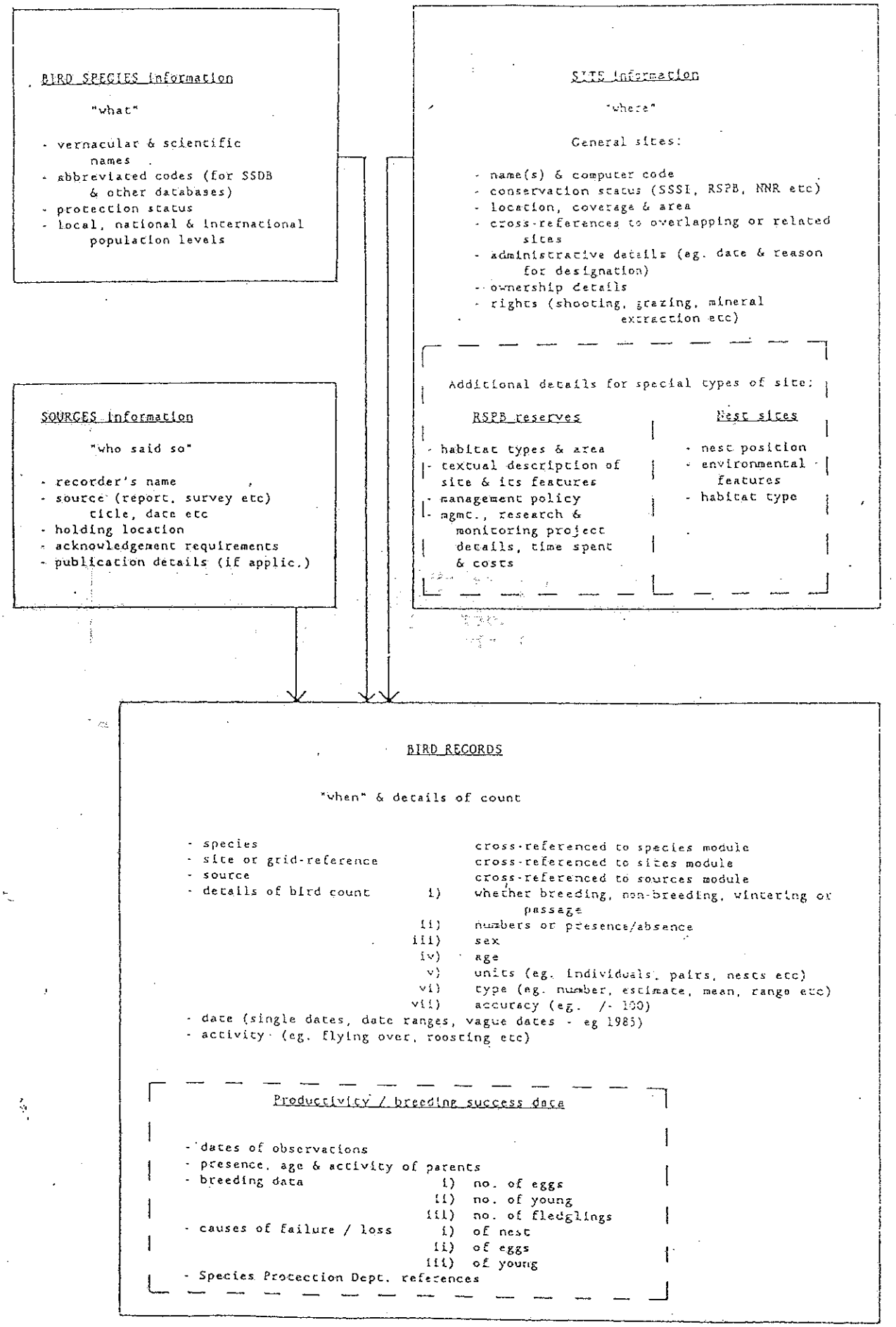
Comments:

Thanks again for finding the time to complete this questionnaire.

Appendix C : Authors of software.

AUTHOR/ COMPANY	SOFTWARE	CONTACT ADDRESS	WHERE USED
ANTEC	COBRA	Pete Fraser 17-19 Emery Rd Brislington Bristol Avon BS4 5PF	Sussex
S.Ball	RECORDER	NCC Northminster House Peterborough PE1 1UA	NCC & certain Trusts
S.Coker	BIORECS	Mountain Clarbeston Road Haverford West SA63 4SG	Welsh Trusts
		T.Easterbrook 81 St Marys Rd Adderbury Banbury Oxon	Banbury
M.Humphries and Oxford Mobius	TETRAD	68 Church Way Iffley Oxford OX4 4EF	Shropshire
D.Price		8 Scattor View Bridford Exeter EX6 7JF	Devon
K.Smith		24 Mandeville Rise Welwyn Garden City Herts AL8 7JU	Herts

Appendix D : Proposed structure of RSPB's Sites and Species Database



Appendix E : Software packages for the individual.

SOFTWARE	CONTACT ADDRESS	OPERATING SYSTEM	COST
Bird Brain	Sandpiper Software 153 Michele Circle Novato California 94947	MS-DOS	$68
Bird Catcher	Davis and Makohan 12 St Mary's Close Albrington Wolverhampton West Midlands WU7 3EG	Amstrad CP/M	£15
Bird Log	Jonathan Barnes 30 Cassiobury Park Avenue Watford Hertfordshire WD1 7LB	Acorn Archimedes	£5.99
Bird Recorder (Gripsoft)	Jack Levene 6 Fiddlers Lane East Bergholt Colchester CO7 6SJ	MS-DOS	£50
Plover	Ideaform Inc. Box 1540 Fairfield Iowa 52556	Macintosh	$125