Watsonia, **10**, 265–272 (1975).

Five years of a county Flora project

S. R. J. WOODELL

Botany School, University of Oxford

ABSTRACT

An account is given of the problems arising from enrolling the co-operation of a large number of helpers in compiling a county Flora, and some suggestions are made for overcoming these problems.

INTRODUCTION

The second edition of Druce's *Flora of Oxfordshire* was published in 1928. In 1968 Dr A. J. Richards, Mr A. R. Perry and myself began work on a new Flora of the county. A five-year programme of field work was completed in 1972, although we expect that recording will continue beyond 1975. The recording, on a 2 × 2 km tetrad basis, has been done mostly by a number of amateur helpers. By the end of 1972, 94% of the 596 tetrads had been visited. In this paper I shall discuss the problems and advantages of using a large team of recorders.

Edees (1972) commented that he had done all the recording for his *Flora of Staffordshire* because the disadvantage of obtaining not very complete records was more than compensated for by evenness of coverage. At least one other present compiler of a county Flora is doing it himself. Even in a small county doing all the recording involves an amount of field work normally beyond the capacity of one person. In a county the size of Oxfordshire a co-operative effort is essential if the Flora is to be finished within a reasonable time. Such co-operation carries with it disadvantages additional to those mentioned by Edees. The aim of this paper is to document the problems involved in using a number of helpers unevenly distributed throughout the county, with different levels of expertise and with varying amounts of time to devote to the project. My intention is to suggest ways in which the worst of the pitfalls can be overcome so that future Flora writers can both save time and get maximum return from effort expended.

THE METHOD OF RECORDING

When we began we publicized the project to local Natural History Societies and to the Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust. We wrote to each B.S.B.I. member in the county or adjacent to it, and advertised in the local press. We found over 80 people willing to help.

We sent each person an instruction sheet, keys for the identification of 'difficult' groups, and some record cards. These are similar to B.S.B.I. Map Scheme cards, listing all plants that have occurred more than a few times in the county. Recorders send in their cards annually, the records are transferred to Master Cards, and the recorders' cards are returned.

For four years we allowed recorders to go where they chose, but it became clear that large areas of the county were being unvisited, so in 1972 we allocated tetrads to recorders giving each a number of tetrads proportional to his or her previous annual output, and we are continuing this. Individual recording has been supplemented by a series of field meetings to interesting or under-recorded areas.

Inevitably the number of helpers soon declined and the team now consists of about 35 regular recorders and a number of casual ones. Nevertheless this is high compared with most county Floras in preparation, and doubtless reflects the presence in the county of the university town of Oxford and the close proximity of that of Reading. Recorders contribute records annually for from one to as many as 49 tetrads.

THE TARGET

As in most local Floras the bulk of the work involves collecting species records. Basing our target on the species/area estimates produced by Dony (1963) for the botanically similar county of Hertfordshire, we assumed an average number of 338 species/tetrad in Oxfordshire. We aimed at a minimum of 80% representation, i.e. about 270 species/tetrad. Marginal tetrads vary in size from a few hundred m^2 to almost 4 km^2, but we expected an average of approximately 250 records from such tetrads. This gives a total of 157,000 expected records ($400 \times 270 + 196 \times 250$).

Naturally the enthusiasm generated by a new project, and the existence of a body of local knowledge resulted in a large number of records in the first year: 37,000 or nearly a quarter of the total.

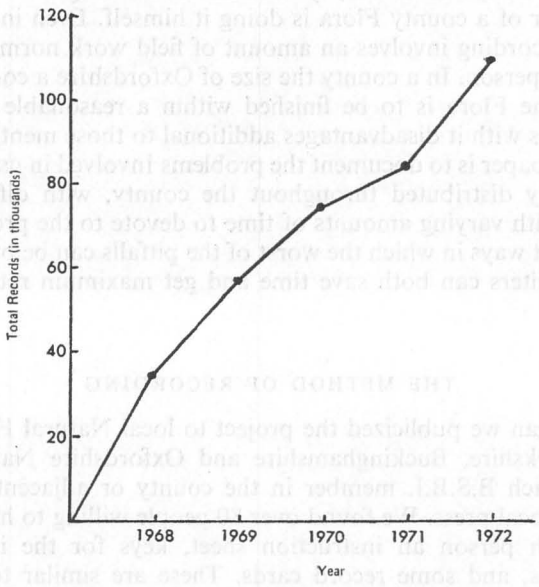

FIGURE 1. Total number of records (cumulative) for the years 1968–1972.

Fig. 1 shows the progress of record-gathering for the first five years. The allo-

cation of tetrads in 1972 boosted the otherwise steadily declining numbers of records per year, and the total of 109,000 records put the final target within reach. The latest count, at the end of 1973, was 121,000.

THE PROBLEMS

Fig. 2 shows that there was a large proportion of unrecorded and under-

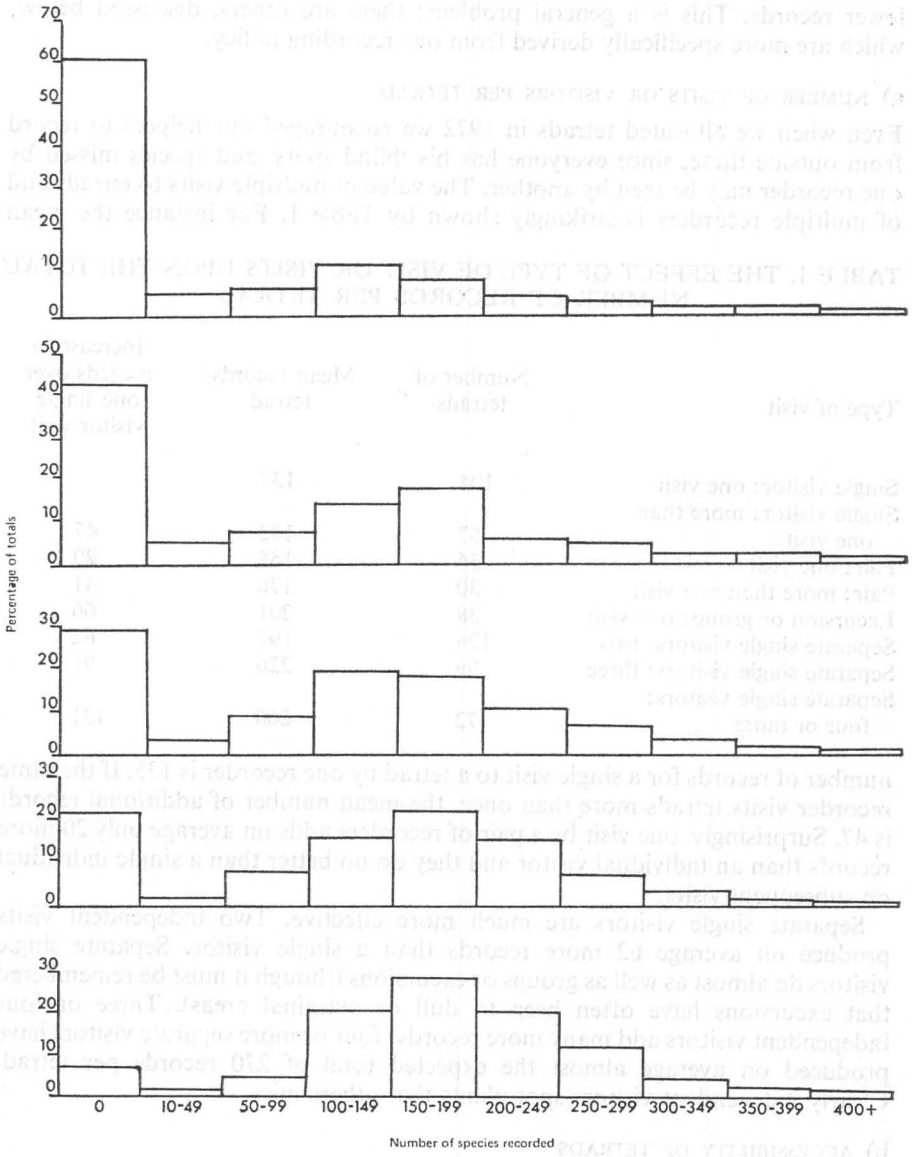

FIGURE 2. Annual histograms of numbers of tetrads with different total-classes (classes of 50 from 1968 (above) to 1972 (below).

recorded tetrads until we started allocation. Also there is still a predominance (60%) of tetrads with less than 200 records. This is partly the result of local recording from prolific helpers, as is evident from data presented later. Fig. 2 also shows that until 1971 there were relatively few (only 22%) tetrads with more than 200 records. Although this is inevitable in the early years, as recorders attempt to cover different areas, it indicates the disinclination of recorders to visit tetrads with more than about 100 species already recorded, and a real tendency to give up working a tetrad as each succeeding hour or visit produces fewer records. This is a general problem; there are others, discussed below, which are more specifically derived from our recording policy.

a) NUMBER OF VISITS OR VISITORS PER TETRAD

Even when we allocated tetrads in 1972 we encouraged our helpers to record from outside these, since everyone has his 'blind spots' and species missed by one recorder may be seen by another. The value of multiple visits to tetrads and of multiple recorders is strikingly shown by Table 1. For instance the mean

TABLE 1. THE EFFECT OF TYPE OF VISIT OR VISITS UPON THE TOTAL NUMBER OF RECORDS PER TETRAD

Type of visit	Number of tetrads	Mean records/ tetrad	Increase in records over one single visitor visit
Single visitor: one visit	104	135	
Single visitor: more than one visit	57	182	47
Pair: one visit	34	155	20
Pair: more than one visit	30	176	41
Excursion or group: one visit	38	201	66
Separate single visitors: two	124	197	62
Separate single visitors: three	99	226	91
Separate single visitors: four or more	72	266	131

number of records for a single visit to a tetrad by one recorder is 135. If the same recorder visits tetrads more than once, the mean number of additional records is 47. Surprisingly, one visit by a pair of recorders adds on average only 20 more records than an individual visitor and they do no better than a single individual on subsequent visits.

Separate single visitors are much more effective. Two independent visits produce on average 62 more records than a single visitor. Separate single visitors do almost as well as groups or excursions (though it must be remembered that excursions have often been to dull or marginal areas). Three or four independent visitors add many more records: four or more separate visitors have produced on average almost the expected total of 270 records per tetrad. Clearly independent visitors spot plants that others miss.

b) ACCESSIBILITY OF TETRADS

Oxfordshire is over 60 miles long. Several of our recorders depend on public transport; even those with cars prefer not to drive too far, a tendency which may

well increase. This means that areas around the most assiduous recorders' homes are likely to be especially well covered (Table 2). Three of these recorders have

TABLE 2. THE INFLUENCE OF A RECORDER'S RESIDENCE ON THE NUMBER OF RECORDS PER TETRAD

The 'home' tetrads are those of the eight most active recorders. The random tetrads were selected using a table of random numbers.

Selected tetrads		Random tetrads	
Records in recorder's 'home' tetrad	Records in 'home' plus surrounding eight tetrads (mean number)	Records in randomly selected tetrad	Records in random plus surrounding eight tetrads (mean number)
317	237	192	156
290	250	212	191
357	222	147	123
446	356	261	277
396	337	104	225
424	254	125	145
170	256	85	122
401	283	247	251
Mean number/tetrad 350	274	172	186

already reached the target figure of 270 species/tetrad on average in their 'home tetrads and the eight immediately surrounding them, and the other five are rapidly approaching this average. In contrast the numbers for randomly selected tetrads and their surrounding eight tetrads are not very different from the mean number/tetrad of 183 for the whole county. The eight recorders' 'home' tetrads have nearly twice the mean number/tetrad for the county. They do not all live in exceptionally rich areas botanically and the figures show what repeated visits by a keen recorder can achieve.

c) 'DULL' AND UNPOPULAR AREAS

The map of records/tetrad up to the end of 1972 shows that four areas are under-recorded: the area east of Bicester, that bordering the River Thame east of Oxford, a belt across the county south of Banbury and a strip north of the River Thames west of Oxford. The reason for this probably lies partly in the (not entirely unjustified) belief that they are botanically dull and partly in the absence of recorders living near them. They contain much arable land and reseeded pasture on heavy clays and are therefore unattractive for walking and casual recording. They look dull and careful searches need to be made for the few rich localities. Yet in each of these areas there are tetrads which exceed the target of 270 species.

d) MARGINAL TETRADS

Like the 'dull' tetrads these are not so willingly visited. No less than 23 of the 38 tetrads unvisited at the end of 1972 were marginal. Some are small and difficult of access. Dony's (1963) paper showed that one can expect quite large numbers

of species in small areas. I have found that in quite a short visit one can record over 100 species in a marginal tetrad of only a few hundred m². The mean number of records for such tetrads is 174 and this compares favourably with 198 for whole tetrads. Indeed one marginal tetrad already has over 400 records.

e) IDENTIFICATION

It is inevitable that with such a varied team of amateur helpers their experience and expertise will also vary. The distribution maps of some of the species that we have produced show some very uneven recording, and while some of the under-recorded species are those only visible for a short period (for example woodland spring flowers and stubble-field weeds) it is clear that some species are not recorded by all helpers. Grasses and sedges, and some of the 'critical' groups are the worst problem. A more serious snag is misidentification, and it is not always easy to see the extent of this.

THE SOLUTIONS

There is no complete answer to the problems I have outlined, but our experience so far has enabled us to see some of the ways by which they can be minimized.

a) NUMBER OF VISITS OR VISITORS PER TETRAD

This has the most influence of all on the numbers of records. The figures in Table 1 need no extra emphasis. The lesson to be learned from them is that tetrads should be allocated so that at the very least (1) every tetrad is visited by at least two individuals separately and (2) each should be visited at different seasons, preferably April/May and August/September. However I would not recommend allocating tetrads at the outset: one should allow a 'free-for-all' for two or three years to enable people to work their favourite areas and get used to the system, and to enable the organizers to learn their recorders' strengths and weaknesses. After this, under-recorded tetrads should be allocated or used as sites for excursions, which, as well as adding records, enable recorders to meet each other and discuss problems in the field. Allocation is a means whereby a reasonably even coverage can be obtained, but recorders should not be restricted in their freedom to go where they please, despite the fact that this exacerbates the next problem.

b) ACCESSIBILITY OF TETRADS

There is no answer to this. Inevitably, active recorders will do more work near their homes. There is a compensation: the extra time spent in their local haunts results in their discovering uncommon and inconspicuous species often overlooked elsewhere. So although the inclusion of their numerous records in our averages conceals the fact that overall coverage is not as good as suggested by the tetrad average of 173, I can only say that if you have such recorders in your county, be thankful and remember that their value is inestimable. They should be encouraged to travel as widely as possible to mitigate their local effects and improve overall coverage.

c) DULL AND UNPOPULAR AREAS

It is difficult to know how to treat these. Too long spent on them may obscure the real differences between them and richer areas. On the other hand they often

prove to be very rewarding, containing odd pockets of relatively unspoiled vegetation or churchyards, which are refuges for many otherwise rare plants. My advice is to spend at least as much time on these as on richer, more exciting areas, and to organize excursions to them as often as possible.

d) MARGINAL TETRADS

Like the previous category, recorders must be encouraged to visit them yet without paying them undue attention. Excursions have proved useful in this respect.

e) IDENTIFICATION

This is the most difficult problem and I cannot pretend to offer a satisfactory solution. One can provide keys, but many recorders do not have time to use them. We ask people to send specimens of plants they cannot name. Some do, but very few, and often they are among the most competent recorders. We instruct helpers during excursions, which is another good reason for holding as many as possible. However, none of these makes much impression on the overall problem of identification and misidentification. The only real answer lies in hard work by the organizers and the experienced recorders. They can look for known 'difficult' groups. As a Flora nears completion, gaps become more evident and steps can be taken to fill them. We check all records for obvious errors, but misidentification of common plants is difficult to detect. In the end the effect of lack of identification and misidentification will be small by comparison with the total number of records collected, and Flora writers need not worry unduly about it.

Critical groups must be dealt with by each local Flora writer in the light of his own interests, experience, availability of recorders and their willingness to work on or collect these groups.

CONCLUSIONS

The foregoing discussion could well lead to the view that Edees (1972) is right. If an individual has the time then should he, like Edees, do it himself? Would it be better to have a small team of people who between them could cover the whole county and meet regularly to check on progress and compare notes? Maybe one should, but I believe the task is too much for one man to get the most out of such a project, and few counties have a small group of people with either the time or the inclination to do it. Most recent or pending county Floras depend on a number of recorders, all valuable but of varying competence and enthusiasm, and unevenly distributed. Floras compiled in this way harness the time, interest and ability of many people, they give them a sense of purpose in their botanizing that is not provided by casual observation, and they help them to learn more plants. Further they maintain the impetus given by the B.S.B.I. mapping scheme. I have no doubt that the advantages of this method of writing a Flora far outweigh the disadvantages.

ACKNOWLEDGMENTS

Thanks are due to my co-editors, Dr A. J. Richards and Mr A. R. Perry, for their co-operation in launching and maintaining the progress of the Oxfordshire

Flora, and to the former for his comments on this paper. Mrs M. Putman has given useful help in the preparation of the manuscript and Mrs C. Gallon extracted many of the data for me. Finally, I must thank all those who have collected so many records for the Flora. Their contribution is far greater than any problems resulting from enrolling their help.

REFERENCES

DONY, J. G. (1963). The expectation of plant records from prescribed areas. *Watsonia*, **5**: 377–385.

DRUCE, G. C. (1928). *Flora of Oxfordshire*. Oxford.

EDEES, E. S. (1972). *Flora of Staffordshire*. Newton Abbot.

(*Accepted June* 1974)