Monitoring terrestrial breeding bird populations

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7.1 INTRODUCTION

It is important to monitor bird populations for two main reasons. First, birds form an important and popular wildlife resource which is worth conserving in its own right. Second, given that it is impractical to monitor all groups of organisms on a wide scale, birds provide valuable indicators of the state of the environment. They are usually high in food chains and so particularly susceptible to environmental changes. This is well illustrated by the population declines and breeding failures of raptors which drew attention to the harmful effects of persistent organochlorine pesticides (Newton 1979, 1986; Ratcliffe 1980).

Although bird population monitoring is not without difficulty, it is easier than for many other groups of animals. Much has been said earlier in this book about the needs to define clear objectives for monitoring schemes and to establish standards against which changes can be measured. Extensive long-term data are available for bird populations, providing a description of past population fluctuations with which recent changes can be compared. In addition, it is often possible to measure breeding success and survival rates of birds as well as population size, which assists in the interpretation of population changes and may even draw attention to problems before populations start to decline.

Throughout much of Europe and North America, many amateur birdwatchers contribute enormous amounts of time, effort and money to monitoring schemes. Thus it is possible to operate extremely cost-effective monitoring schemes for birds. Most amateurs participate in monitoring schemes because they find it an enjoyable hobby. Schemes which involve complex procedures or paperwork, or which require observers to spend large amounts of time in areas with few birds, are inevitably unpopular. Optimal monitoring schemes for birds must often balance the desirability of a statistically rigorous study design (giving unbiased estimates which are easy to interpret) against the likely number of observers (more observers giving...
increased precision). Most terrestrial bird monitoring schemes in Britain and Ireland are organised by the British Trust for Ornithology (BTO) which coordinates the work of amateur bird-watchers. Much of this work is carried out under contract to the Nature Conservancy Council.

This chapter provides a brief overview of the main methods used for monitoring breeding populations of terrestrial birds, including their reproductive success and survival. The main BTO schemes that monitor terrestrial birds in Britain and Ireland are outlined, together with the new Integrated Population Monitoring Programme, which will combine the results from different schemes to provide a more thorough assessment of population performance. Limitations of present monitoring schemes and priorities for future developments are briefly discussed.

7.2 METHODS FOR MONITORING BIRD POPULATIONS

7.2.1 Territory mapping

This technique, known in North America as spot mapping, is widely used for estimating numbers of pairs of terrestrial passerines during the breeding season. International standards for fieldwork and data analysis have been agreed (Anon 1969), but various modifications and enhancements of the technique have been developed for specific studies (Falls 1981; Wiens 1969).

Standard territory mapping involves a series of visits to the study plot, spread throughout the breeding season. On each visit the locations of all birds seen or heard are recorded on a large-scale map (Figure 7.1a). Species, sex, song and other activities are recorded on the maps, with lines joining records of the same bird and broken lines indicating simultaneous registrations of different birds. At the end of the season this information is transferred onto maps that contain all the information for each species, using different letters to indicate different visits. Clusters of registrations are delineated on the maps and each cluster is taken to represent one territory (Figure 7.1b). Territory clusters are usually delineated manually; although computer algorithms for such analyses have been devised (North 1977, 1979), they are not yet able to use all the information available to human analysts.

There have been many studies of factors that may bias results from territory mapping. The number of territory clusters depends on the detection probability of individual birds on each visit, the number of visits, and the minimum number of registrations (on different dates) required to form a cluster. Low detection probabilities, low numbers of visits, or high numbers of registrations required for a cluster lead to underestimation, while the converse leads to overestimation (Svensson 1979; Dawson 1985; Verner 1985). Results from territory mapping can differ between observers and between analysts (Best 1975; Enemar et al. 1978; O’Connor 1981), although