DEVELOPMENT OF PAN-EUROPEAN BREEDING BIRD MONITORING

David W. Gibbons

ABSTRACT

Gibbons D. W. 2000. *Development of pan-European breeding bird monitoring.* Ring 22, 2: 25-33.

Many changes to the European environment have been as a consequence of Europe-wide, or at least EU-wide, policies. To assess the impact of these policies on birds, it is necessary to have in place pan-European bird monitoring, the best existing example of which is the mid-winter International Waterfowl Census. No similar breeding season bird monitoring exists, although highly summarised information has been collated and about 15 well-established nation-wide, generic annual breeding bird surveys do exist, with further 4-5 schemes introduced in the last few years. Most of these new schemes are more rigorously designed than the established ones. An initiative to bring together data from all these national schemes to provide pan-European population trends is outlined here. A pilot study has examined the manner in which data from national schemes can be collated to produce supra-national (though not yet European) trends. Although the number of national schemes is growing, many countries do not have monitoring schemes and are unlikely to have in the near future. To overcome this in the medium-term, it is proposed that a new scheme be developed to cover all these countries, with a small number of survey plots in any individual country. The results from this „international" scheme could be added to those from the existing national schemes to produce truly European trends. Several variants of this proposed design are discussed.

D. W. Gibbons, RSPB, The Lodge, Sandy, Bedfordshire, SG19 2DL, United Kingdom, E-mail: david.gibbons@rspb.org.uk

---

Key words: bird monitoring, pan-European, monitoring schemes

THE NEED FOR PAN-EUROPEAN BIRD MONITORING

The widespread changes in European land use, which have occurred within the last fifty years, have had an enormous impact on wildlife, much of it deleterious. Traditionally it was thought that the establishment of protected areas would be sufficient to ensure the maintenance of wildlife. More recently, however, it has become apparent that biodiversity cannot survive simply within these small, isolated patches of land. It is now well understood that the intervening countryside needs to be managed in a much more biodiversity friendly manner, particularly those areas given

over to agriculture from which wildlife is fast disappearing (*e.g.* Tucker and Heath 1994, Pain and Pienkowski 1997). For example, of 195 bird species in Europe with unfavourable conservation status, 116 are farmland birds (Tucker and Heath 1994).

Many of these changes in wildlife have come about as a consequence of changes in land use, influenced by European, or at least European Union, policies such as the Common Agricultural Policy. The effects of such policies are likely to spread further east in Europe as former eastern block countries join the EU in the early years of the 21st century. The impact that such changes will make on wildlife needs to be closely monitored by the scientific and conservation communities and its results made readily available to politicians, their policy advisors and the general public alike. To measure the impacts of policies, which act over such a broad geographical scale, it is sensible to monitor wildlife at a similar scale. Birds are ideal candidates for such work because they live at a high trophic level (thus integrating changes occurring at lower levels), they have great public resonance and it is possible to collect large quantities of data from skilled volunteer enthusiasts. These data can be highly summarised to produce wildlife indicators. The best example of such an indicator is probably that of the United Kingdom Government which uses breeding bird population trends as one of 14 headline social, economic and environmental indicators of the „quality of life" (or Indicators of Sustainable Development, as they are formally known – Anon 1998) alongside others such as levels of crime, life expectancy and educational qualifications. In addition, individual member states of the EU are obliged to monitor bird populations to ensure that they are complying with a number of EU Directives (*e.g.* the „Birds Directive") and international conventions (*e.g.* Ramsar, Bonn, Berne).

EXISTING PAN-EUROPEAN BIRD MONITORING

Currently there are two sources of information on pan-European bird population trends; the International Waterfowl Census (IWC – Monval and Pirot 1989, Rose 1995) and the European Birds Census Council (EBCC) / BirdLife „European Bird Database" (EBD – Tucker and Heath 1994, Hagemeijer and Blair 1997). The IWC is a standardised international scheme for annual monitoring of waterfowl populations annually and is co-ordinated by Wetlands International. It was initiated in 1967 in Africa, Asia and Europe and has accumulated long time-series data for ducks and Coot (*Fulica atra*) and slightly shorter time-series for many other species of waterfowl. These species are highly congregatory in nature, so monitoring is by complete census (all individual birds are counted) and there is no formal sampling design of any kind. Wetlands International does not run the monitoring themselves, rather this is devolved to national monitoring organisations and WI collate this information.

By contrast, the EBD contains information on trends of all breeding species in each European country over a 20-year period (1970-1990), obtained by means of a simple scoring system (+2, +1, 0, -1, -2 – representing population increases, sta-

bility and declines) applied by within-country experts. Although the EBD has proved exceptionally valuable in assessing the conservation status of European birds (Tucker and Heath 1994), the level of monitoring information that each individual country had to call upon to make these trend assessments was highly variable, and in some cases was no better than informed guesswork. In addition, these data took several years to collate and gave trends over only a single, long time period (20 years). Although updating the EBD at 10- or 20-year time scales would allow reassessments of conservation status, it would be slow to report on the environmental effects of policy changes and individual governments could well question its reliability. Although a handful of other bird monitoring schemes does cover more than a single European country (*e.g.* raptors – Mannen and Stubbe 1998), none are yet truly pan-European.

A REVIEW OF NATIONAL BIRD MONITORING IN EUROPE

A recent review of bird monitoring across Europe estimated that *ca* 5 million DM are spent on bird monitoring in Europe annually, about half of this on nearly 80 generic (*i.e.* covering many species) annual sample bird monitoring schemes, mostly during the breeding season (Marchant *et al.* 1997). Some European countries run several schemes, others – none; some schemes cover the entire country and much of its avifauna, others – part of the country and few species. About 15 European countries have established nation-wide, annual sample schemes covering widespread and common breeding birds; many are in northern and western European countries. Among the countries with established schemes are United Kingdom, Netherlands, Denmark, Norway, Sweden, Finland, Estonia, Latvia, Lithuania, Czech Republic, Germany and Switzerland. In the last four years, new schemes have been started in the Republic of Ireland, Hungary and Spain; schemes are also planned for Poland, Italy and, possibly, Bulgaria, and several other countries have expressed an interest (*e.g.* Portugal, Slovakia). The distribution of these schemes is shown in Figure 1. The great bulk of fieldwork for these surveys is undertaken by keen volunteer ornithologists, coordinated by professionals working for national monitoring organisations, conservation agencies or universities.

The 80 or so schemes encompassed by Marchant *et al.*'s (1997) review differed in both the field method used (Table 1) and their design (*e.g.* the manner in which plots of land to survey were selected – Table 2) and the year in which they commenced. Field methods for bird survey have been well documented (*e.g.* Bibby *et al.* 1992, Gibbons *et al.* 1996, Greenwood 1996, Gilbert *et al.* 1998) and will not be outlined here. The most frequent method used was complete counts of birds on a plot of land (which includes territory mapping), with line transects and point counts being of similar occurrence. While the field method used might have some influence on the amount of time required to collect and analyse the data and, ultimately, its precision, it would not necessarily introduce systematic biases into the monitoring scheme data. Unfortunately, the same cannot be said for the manner, in which the

Fig. 1. The distribution of existing, national, breeding bird monitoring schemes. Established, recent (set up within the last four years) and proposed schemes are shown as filled circles, filled squares and unfilled circles respectively. (Modified and updated from Marchant *et al*. 1997).

Table 1
Field methods used by annual sample bird surveys in Europe.
Adapted from Marchant *et al*. 1997

Line transect	Point count	Complete counts[1]	Capture methods[2]	Combination and other	Total
13	14	29	6	16	78

[1] includes territory mapping
[2] mainly constant effort type mist-netting.

sample plots, on which to count, are chosen. Free choice of plot by observers still predominates (Table 2) but should be avoided. Because observers will be unable to choose genuinely representative sites, trend information collected from them will not necessarily mimic the true, but unmeasured, national trends. The danger is that true population declines may go unnoticed and that spurious trends may lead to conservation resources being squandered on the wrong species. However, Marchant *et al.*'s review did not encompass many of the recently instigated national schemes, all of which either select plots by a formal random sampling design or, at least, allow the observer much less choice of plot location. Complete randomness cannot always be achieved, simply because the distribution of willing fieldworkers does not accord with this ideal.

Table 2
Method of plot selection used by annual sample bird surveys in Europe.
Adapted from Marchant *et al*. 1997

Method of plot selection	No. of schemes
Free choice[1]	41
Systematic[2]	11
Stratified[3]	7
Random/stratified random[4]	3
Combination/other	16

[1] observer choice of plot
[2] e.g. points on a regular grid
[3] sampling intensity varies with 'strata', with strata being different regions, habitats etc.
[4] plot selected entirely at random, or at random within different strata

The UK, Republic of Ireland, Spain, Hungary and elsewhere have adopted more formal sampling designs. In the UK, transects are walked in randomly-selected 1-km squares, stratified by observer density – this approach ensures that the selected plots are entirely random but takes into account the distribution of observers. In Spain and Hungary, the approach is slightly less rigorous, nevertheless, is still a great improvement over free choice of plots. In Spain, observers undertake point counts within randomly chosen 10-km squares located within a fixed radius of major Spanish cities, while in Hungary point counts are undertaken in 2.5-km squares randomly selected from within an observer chosen area of *ca* 15-20 2.5-km squares. It is anticipated that countries will increasingly adopt such designs.

DESIGNING A PAN-EUROPEAN SCHEME

The existing breeding bird monitoring does not yet give a true picture of pan-European trends, and there are several ways, in which this could be developed. The two most obvious ways are either to use data from established national monitoring schemes in each European country and combine their data to provide pan-European trends, or to ignore all existing national schemes and introduce a new international scheme across all of Europe.

Both of these approaches have advantages and disadvantages. Introducing a new international scheme in all European countries is tempting in that it would be possible to develop a standardised method and to adopt a formal sampling design, probably stratified by major habitat or land use types. The major disadvantage, however, would be that it would completely overlook the existing monitoring being undertaken in each country and would break with the philosophy of subsidiarity being engendered within Europe. Adding together data from existing national

schemes has the advantages that it will make best use of existing time-series data, will involve established monitoring organisations in a shared vision and will allow individual countries to see how their population trends fit in with continental trends. The disadvantages are that it would not be possible to use a single field method and rigorous sampling design, and many, particularly SE European, countries have no national scheme anyway – as a consequence any trends generated would be pan-NW European.

As many European countries do not yet have national schemes and may not for some years, an alternative third option – of which there are variants (see below) – would be to place a small number of survey plots in each of these countries and to combine data from this new „international" scheme with indices from existing national schemes. Weighted accordingly, this would yield pan-European trends without the need to establish full-scale monitoring schemes in each country. Such an approach would have the added benefit of introducing robust methods of bird monitoring, albeit on a small scale, to countries with little tradition in this area. These small-scale schemes could in time form the nucleus for development of new national schemes.

To implement such an approach it is necessary to (1) devise a method whereby national scheme data can be combined and (2) devise and implement the new international scheme.

COMBINING DATA FROM EXISTING NATIONAL SCHEMES

A method to combine data from national schemes has already been developed and tested for a few species/country combinations for the period 1978-1997 by Statistics Netherlands on behalf of the EBCC (van Strien *et al.* in press). The approach takes account of many differences in method adopted by individual schemes by using summarised trend data (rather than underlying raw data) from each. Thus, irrespective of the field method used, an index could be produced for each species in each country and these indices, once weighted, combined. The manner in which this was done for each species was as follows: an index for each country was generated using a loglinear index method (Pannekoek and van Strien 1998) and, knowing the population size in each country in a single year, the index was converted into country population totals for each year. Thus, for example, if the population of a species was estimated at 100 000 pairs in 1990 when its index was 0.5, its population size was assumed to be 200 000 pairs in a year when its index was 1.0. The overall trend across all countries was generated by simple summing the individual estimated country population sizes for each year separately to yield across-country totals. The method also allows standard errors to be generated. Because of these weightings, the final supra-national trend produced for a given species will be strongly influenced by the trend from a country which holds a large proportion of the European population, and *vice versa*.

There are, of course, problems with combining data this way. Country-specific population size estimates are needed and, although these are available from the EBD, their reliability is questionable (see Tucker and Heath 1994). Some schemes have been running for longer than others and hence it is necessary to estimate trends for those countries for years with missing data. Finally, there may well be biases within the national trend data due to a lack of representativeness among the survey plots. In principle, this bias (*e.g.* oversampling of some habitats and undersampling of others) could be partly overcome by retrospective stratification of the national data, but this remains a considerable problem.

DESIGNING A NEW „INTERNATIONAL" SCHEME

This could be designed in a number of ways, one of which is as follows: European countries with no existing national monitoring scheme would be identified. These countries would be stratified by major habitat/land cover type, and survey plots allocated to each strata at random (ideally). Sample sizes in each strata would need to be large enough to allow generation of pan-European trends by broad habitat / land cover type. One suitable of such high level stratification would be that of EUNIS (European Nature Information System) which has mapped the distributions of nine major inland habitat types (*e.g.* forests, arable, grassland *etc.*). These plots of land would be surveyed using a standardised field method and the data generated added to that from existing national schemes by treating the „international" scheme simply as if it were another country. This would allow the generation of truly pan-European trends. Because the location of survey plots of existing national schemes are known, these could be retrospectively stratified by EUNIS category too, to allow calculation of pan-European trends by major habitat/land cover type.

There are two subtle variants of this approach. The first would be selecting a number of plots from within each existing national scheme and adding these to the „international" scheme plots. These plots could be chosen to fit in with the stratified design adopted for the „international" scheme, though this subset of national plots would still contain some of the biases of the schemes from which they were taken. This approach would also have the potential complication that the field methods would not be standardised across all of Europe, but this needs not necessarily be a problem depending on the manner of trend generation. The second solution would be running national and „international" schemes in parallel in those countries with national schemes, with a standard method being used across all international plots – this would, of course, be equivalent to the introduction of a completely new pan-European scheme. Although, as outlined above, it might be difficult to persuade countries with their own national schemes to undertake also to survey new plots as part of an international scheme, the number of international plots in any country would be relatively small and (as may well prove to be the case because of funding constraints) may only be undertaken every 2-3 years, rather than annually. It would then be possible to produce two sets of trends – annual trends

from combining national trends and an international trend on a 2-3 year frequency interval.

The potential options outlined here are by no means exhaustive, and there will, no doubt, be others that could be considered as well.

CONCLUSION

Pan-European breeding bird monitoring does not yet exist and will only do so with the co-operation of a large number of partners, both within-country bird monitoring organisations and European institutions, governmental and non-governmental. Expertise in bird monitoring has evolved rapidly in the last decade and there are several centres of excellence within Europe, much if it encompassed within the EBCC and BirdLife umbrellas. This expertise needs to be disseminated to the rest of Europe to provide a joint voice, which will become a powerful force in wildlife conservation in Europe.

ACKNOWLEDGEMENTS

The ideas outlined in this paper arose from a workshop organised by EBCC held at the Villa Cipressi in Italy (EBCC 1997) and subsequently by discussions at its conference in Cottbus in 1998 and among the members of its Executive Committee. I thank the following, in particular, for their involvement in these discussions: Richard Gregory and Jeremy Greenwood (British Trust for Ornithology), Ward Hagemeijer (SOVON), Colin Bibby and Melanie Heath (BirdLife International), Arco van Strien and Jeroen Pannekoek (Statistics Netherlands), Soren Svensson (Lund University) and Mark Avery (RSPB).

REFERENCES

Anon. 1998. *Sustainability Counts*. UK Department of the Environment, Transport and the Regions, London.

Bibby C. J., Burgess N. D., Hill D. A. 1992. *Bird Census Techniques*. Academic Press, London.

EBCC 1997. *Report on the workshop on monitoring birds in Europe*. Bird Census News 10: 80-95.

Gibbons D. W., Hill D. A., Sutherland W. J. 1996. In: Sutherland W. J. (Ed.) *Ecological Census Techniques: a Handbook.* Cambridge University Press, Cambridge.

Gilbert G., Gibbons D. W., Evans, J. 1998. *Bird Monitoring Methods: a manual for techniques for key UK species.* RSPB, Sandy.

Greenwood J. J. D. 1996. *Basic techniques.* In: Sutherland W. J. (Ed.) *Ecological Census Techniques: a Handbook.* Cambridge University Press, Cambridge.

Hagemeijer W. J. M., Blair M. J. (Eds). 1997. *The EBCC atlas of European breeding birds: Their distribution and abundance*. T. & A. D. Poyser, London.

Mammen U., Stubbe M. 1998. *Jahresbericht zum monitoring greifvogel und eulen europas.* Martin-Luther-Universitat, Halle/Saale.

Marchant J., Forest C., Greenwood J. J. D. 1997. *A review of large-scale generic population monitoring schemes in Europe.* Bird Census News 10: 42-79.

Monval J.-Y., Pirot J.-Y. (Eds). 1989. *Results of the IWRB International Waterfowl Census 1967-1986.* IWRB Special Publication No. 8. Slimbridge

Pain D. J., Pienkowski M. W. (Eds). 1997. *Farming and birds in Europe*. Academic Press, London.

Pannekoek J., Van Streien A. 1998. *TRIM 2.0 for Windows (Trends & Indices for Monitoring data)*. Statistics Netherlands, Voorburg.

Rose P. 1995. *Western Palearctic and South-West Asia Waterfowl Census 1994*. IWRB, Slimbridge.

Tucker G. M.,33 Heath M. F. 1994. *Birds in Europe – their Conservation Status*. BirdLife International, Cambridge.

van Strien A. J., Pannekoek J., Gibbons D. W. in press. *A method for indexing European bird populations based on results of national censuses*. Bird Study.