

JNCC/BTO Stakeholder Workshop: Demographic monitoring of bird populations

BTO Thetford - 6 September 2011

Summary and Recommendations

Stakeholder and Policy Requirements

Under a Partnership agreement with the JNCC, the BTO operates several schemes aimed at monitoring the numbers and demography of a range of widespread British birds. While monitoring the abundance of particular populations can be helpful in determining threats, quantifying demographic parameters is necessary to understand *why* such changes might occur. The conservation policy agenda is moving away from the conservation of individual species to focus on wider issues of land management, climate change, ecosystem services and, in marine environments, fisheries management, as exemplified by the recent Lawton review, *Making Space for Nature*. While quantifying demographic variability is still fundamental to understanding reasons for species population change and hence wider impacts, monitoring programmes will need to inform these broader environmental issues (for example average nesting success across multiple species could provide an indicator of resource availability). There is also a need for an international context to such monitoring, both for biological reasons (e.g. do recent declines in wader number in the SPA network represent real population declines or changes in demography, namely, juvenile birds dispersing shorter distances) and, increasingly, in determining legislative responsibility for action. Understanding demography can help determine, for example, whether recent declines in Afro-Palaeartic migrants are a result of land-use pressures on their European breeding grounds, their African wintering grounds, or on intermediate staging areas.

There is likely to be increasing devolution of conservation policy as each administration faces differing pressures and intensity of land management. Not only will this result in biodiversity conservation being accorded different priorities, they are likely to give rise to different land-user/wildlife conflicts. There will be an increasing demand for regional and site-based information, for example, Natural England's key performance targets include: increasing the area of SSSIs in 'Favourable' condition, increasing the amount of land entered into the Higher Level agri-environment scheme (HLS), and improving the status of priority habitat networks, assessment of which will need an evidence base. Key to their success will be the requirement to maintain, and improve, ecological connectivity, an area in which knowledge is currently sparse. In the marine environment, the Marine Strategy Framework Directive is a key policy driver and, in the short-term, the need to designate and manage Marine Protected Areas.

Key Recommendations

- Greater integration of demographic information with that on abundance to allow more informed reporting. The Adaptive Harvest Management framework may be particularly helpful in that it allows competing models to be evaluated objectively.
- Interpretation of population status is often hampered by lack of data on policy-relevant environmental covariates, though identifying suites of ecologically similar species may alleviate this somewhat.
- Develop measures of ecological connectivity and quantify dispersal within and between habitat networks.

- Farmland is a priority habitat (if only in terms of area) and the one most affected by policy drivers, but suburban habitats could provide a useful 'control' habitat when it comes to understanding population processes as these areas may be less pressured.
- Develop local reporting of demographic information in relation to the SSSI, SPA and other networks to inform site condition monitoring
- For migratory waterfowl, particularly, there is a need for monitoring to encompass the flyway scale and there are opportunities for BTO to export its expertise in this area.
- Existing collection of demographic data can sometimes be rather fragmentary and there is a need to identify mechanisms for allowing disparate data to inform a common reporting framework through increasing inter-organisation collaboration.

Volunteer Engagement in Monitoring

Given finite resources, it will not be possible to monitor annually demographic processes in all populations, consequently, some degree of targeting is required. Note that, in many cases, information averaged over several years can still provide useful insights, especially for scarce species. Monitoring should therefore aim to cover a representative suite of taxa and habitats, though this clearly needs to reflect the practical challenges of gathering such data, which may be substantial. There are some species, mainly passerines, for which we already have enough data available to construct useful population models, while for other species this is realistically achievable with more targeted efforts; there are some species, though, for which enough data cannot be collected through large-scale volunteer-based monitoring.

The BTO already operates two schemes which collect targeted demographic data: CES which monitors a suite of birds typical of the wider countryside and RAS which involves projects targeted at particular species. These are complemented by data gathered through the wider ringing and nest recording schemes. In collecting these data the efforts of the ringers and the nest-recorders should be acknowledged, contributing as they do in excess of 70,000 person days per year. In general, they are keen to be given direction and know that the data they gather are put to good use; but they need to be appropriately supported. Ring pricing will form an element of this, but increased guidance and training will be more beneficial. In targeting future effort, we need to consider both increasing the range of species covered, particularly those that are indicative of particular habitats or ecological processes and, for those species for which we already have reasonable data, increasing spatial representivity, both geographically and by habitat, while recognising that the available pool of recorders is not geographically evenly spread. We are fostering greater integration of ringing and nest-recording activities and also an improved structure to these activities, particularly through the CES and RAS schemes.

Key Recommendations

- We need to encourage a more holistic approach with productivity and survival data gathered in the same areas, this may require involving people who are specifically not ringers, but contribute in other ways, e.g. nest-recording or ring-resighting.
- RAS offers the greatest potential for increasing our ability to monitor survival rates, however, it does require substantial efforts to re-invigorate it; the scheme guidelines need to be improved, and some flexibility introduced as particular species may have very different monitoring requirements.

- We should encourage ringers to analyse their own data, both to provide local site feedback (especially where they are operating in a designated area, for instance) but also to stimulate further data collection.
- We need to encourage ringers to think about project ringing from an early stage in their career, and to target those who are 'nearly' doing a CES or RAS as part of their ringing.

Presentations and Discussions

The workshop was divided into a morning session aimed at identifying what targets we want to achieve, and an afternoon session to identify the best ways to achieve such targets. In each session short presentations outlining key issues were followed by group discussions.

Stakeholder and Policy Requirements - Presentations

Collection of demographic data is needed in both the long and the short. Long-term data collection is essential to produce reliable results on survival trends and drivers of changes, whilst short-term data collection is needed to answer specific applied questions that were of interest to policy-makers, land-managers and other decision makers. Thus, effort should reflect data collection on several geographic scales, ranging from the national to the locally relevant. One way to achieve this may be by targeting a representative range of key species that would represent different habitats that we want to identify environmental drivers for or to monitor the value of some of the actions already taking place. Targeted projects, like RAS and CES, are ideal in this regard in that they allow analysis at both the national and the site level. Encouraging volunteer ringers and nest recorders to participate in focused projects will require a mix of guidance, feedback, support and financial incentives.

The JNCC/BTO Partnership focuses on the integrated targeting of demography population to achieve a coordinated approach between the various BTO Schemes. In particular, demography provides a mechanism to understand population changes and environmental drivers. Through the Partnership BTO measures population changes, identifies likely demographic mechanisms, environmental drivers and correlates, and synthesises published information on factors affecting abundance. One valuable mechanism for identifying mechanisms of change involves analysing cross-species measures of demographic performance (e.g. breeding performance recorded through the Nest Record Scheme). This modelling process can be used in both a conservation and management framework. BTO is aiming towards a more model-based approach to population monitoring, this may be particularly relevant in an adaptive management framework, for example wildfowl species. Results are provided in several ways, both through the peer-reviewed literature, through the internet, particularly the Wider Countryside Report, and directly to decision-makers.

The focus of future research should be based on current priorities, which will change, rather than continue where money has been spent before. The focus now is on landscape management to address questions related to global warming and pressure on land use, such as ecosystem services, from food production, to biofuels, to recreation. One of the important questions is how these uses will impact bird populations, and many answers seem to come from correlations between variables and data on abundance of bird species. We need to better focus the collection of demographic data to support and further inform these analyses. Thus, the core of the JNCC/BTO strategy is to target a set of species that will help to understand the effect that land management, climate change and similar pressures will have on bird populations. For marine ecosystems the main problems that have been identified are fisheries and climate change, and in this context demographic data have provided valuable insights. There is a clear need, though, to ensure that demographic monitoring addresses the needs of JNCC if the Partnership is to be effective.

An emerging question from a legislative and conservation point of view is where responsibility lies, particularly for migratory species which cross international boundaries. Identifying where ecological drivers of population change will be critical, though in some cases action may need to be taken at a broader scale, for example through reduction of carbon footprint rather than directly through species-specific action plans. These may become less important in the future, as policy focuses on landscape conservation and management although some species will still benefit from this approach.

Climate change is a major factor in determining Natural England's priorities. The organisation has six performance indicators on which it is judged by Defra, and several four-year aims, including ensuring that investments made through environmental stewardships deliver results on biodiversity. Natural England also has an Integrated Monitoring Programme which aims to improve the outcome of land management in part by developing indicators that work at multiple scales to secure evidence that the integrated approach delivers results. Acquiring knowledge at local scale, including improvement and performance of SSSIs, has to be priority over data at a national scale. The recent Lawton Review (*Making Space for Nature*) and subsequent Natural Environment White Paper will be key drivers of policy in the short-term (e.g. in establishing Nature Improvement Areas) as will increasing social and economic conflict with some avian species.

Demographic drivers and environmental causation are two elements to investigate what drives population changes in birds. Demographic data can identify causal reasons for declines and they allow measurement of the effect of management intervention, weather, predation, climate change, all of which are aspects that data on abundance alone cannot identify. There are limitations associated with demographic data collection, though: data for some species (especially scarce ones) are sparse, it may be difficult to collect enough data on several geographic scales for detailed local analyses, covariates such as data on predators and land management are often lacking, and some parameters are difficult to measure (e.g. survival from fledging to first breeding season or productivity for multi-brooded species). The development of new statistical approaches to address some of these issues would be a key priority. A possible approach would be to identify and promote detailed studies focused on high priority species for which data are currently not quite sufficient, though there is also a need to achieve good geographic sampling. It would be worth exploring the possibility that volunteers could collect additional environmental data, such as habitat and predator abundance, whilst out ringing or nest recording. This would be particularly valuable if it could be integrated with areas under existing environmental designations

Stakeholder and Policy Requirements - Discussions

Terrestrial group

Decisions on the particular direction of demographic projects may be difficult given the uncertainty of future policies. There is an equal need for short-term and long-term monitoring approaches, but there is a need for a very targeted approach to questions that will lead to answers relevant to decision-makers. Demographic data could be centred around suites of species that are characteristic of key habitats, something that BTO is already trying to do. Focussing solely on species of conservation concern may be counter-

productive as these species may be scarce and hence challenging to collect sufficient data on, particularly through the BTO's large-scale volunteer network. It may be that that abundant species may provide more data which can be used to inform conservation decisions by proxy, particularly where they share the same habitat or ecology as conservation priority species. Data on relevant environmental covariates may already be being collected by volunteers from other organisations, which BTO could liaise with.

Demographic data are used for identifying mechanisms behind changes, but a long-term monitoring approach is needed to achieve reliable results, particularly since there is often a substantial lead time in which to collect sufficient data. Survival analyses should be based on long-term studies, as should questions relevant to long-lived species. Demographic monitoring can also provide early warning of population problems, and the magnitude of stochastic events.

The top priorities with respect to improving the types of demographic data collected that will help to address policy relevant questions are the need for a greater geographic spread in the data sampling; increasingly, an ability to address questions at a local level; identifying suites of species that can be used as flagships for different habitats that need monitoring; identifying how species adapt to changes, e.g. through dispersal processes, about which relatively little is known; identifying ways to predict what an intervention will achieve.

Priority habitats are those that are currently under-represented and we still need data for, such as farmland and upland, and habitats that are increasing in extension, such as urban and suburban areas. Another priority is to monitor environmentally designated areas to know how well they are performing, ideally with relevant feedback at a local level. Similarly, there is also a need for monitoring habitats under different legislations to compare them, such as nature reserves and the wider countryside or AES farmland and non-AES ones.

Waterbird group.

The 'waterbird' group focused on identifying the responsibilities of the UK in terms of policy making. Breeding seabirds are probably the avian group for which the UK is of most importance in an international context, and continued intensive study, including ringing chicks and adults, is vital. For waders in particular, the coastal areas of the UK are very important, whilst challenges are present at geographical scale when attempting to study seabirds foraging at open-sea. The priorities identified for waders were stop-over sites and wintering grounds. There is a need for an international approach to data collection and management of waterbird populations at the level of the population flyway, building on existing initiatives and data. It was noted that funding and coordination of such initiatives were not necessarily straightforward, particularly where data are collected and curated by multiple organisations. There were likely to be opportunities for the BTO to export its experience in managing such large-scale data collection and curation of long-term data. A key challenge will be in drawing such disparate and co-ordinating sampling strategies across organisations. In addition to monitoring of populations *in situ* at other points in the flyway, there are opportunities to use monitoring in Britain to provide information, as it will be more easily collected, for example using the ratio of juvenile birds in winter waterfowl catches to provide an index of breeding productivity at northern latitudes.

Volunteer Engagement in Monitoring - Presentations

The second part of the day was devoted to understanding what can be done to achieve the aims identified in the morning session.

There are some species, mainly passerines, for which we already have enough data available to estimate survival rates, whilst for other species we can realistically achieve enough data with more targeted efforts. There are some species, however, for which enough data cannot be realistically collected through large-scale volunteer-based monitoring. Traditionally inference has been based on large-scale analyses of birds recovered dead. However, the number of such reports is decreasing and it is likely to be difficult to change the reporting behaviour of the public towards ringed dead birds substantially in the short-term, therefore live retrap data are likely to be more useful for analysis, since a greater amount of data can easily be generated. However, in order to use such data effectively, it needs to be collected in a structured way since local site effects need to be accounted for. CES is such a scheme which provides data on commoner species, while RAS targets individual species. Colonial breeding seabirds and wintering waterfowl are key conservation priorities, but present particular challenges in collecting robust data. Seabirds tend to occur where there is low density of ringers and members of the public, and effort on marking and resightings has to be understood in order to create reliable estimates of survival rate. Some species of waders are more likely to be targeted in sufficient numbers to yield results in a RAS context, and ringing can also be used to estimate recruitment, especially of Arctic species. Wildfowl are difficult and expensive to target, therefore it is unlikely to be a priority group for the moment.

Ringers and nest-recorders are a powerful source of data, and they are keen to be given directions and to know that the data they gather are put to good use. The ringing scheme is funded jointly by the ringers, the JNCC/BTO Partnership (mostly targeted at the larger ring sizes) and the BTO. There are two main costs associated with the Scheme: issuing the rings and subsequent processing of any recoveries. We currently provide subsidies (which reduce the 'up-front' cost of rings) and refunds (provided at the end of year) to direct ringing effort towards target species, which currently include, *inter alia*, birds of conservation concern, raptors, waders and seabirds. For some groups (notably those for which rings are expensive, e.g. waders and seabirds) these have a large effect in determining the numbers ringed, for other species they have a valuable effect in providing ringers with the feeling that their effort is worthwhile. The amount of money for subsidies and refund will not increase, but a re-distribution of these funds may help focus ringers towards projects and species that will support our aim to better target effort towards demographic monitoring.

Specific projects will provide valuable data, but maintaining general ringing is also important, not only for training purposes, but also because general ringing is often done on a site level instead of a species level, and hence can provide important information at a local level. The Merseyside Ringing Group is particularly keen on the integrated approach between nest recording and ringing, but members find it difficult to find the time to nest record and be involved in formally structured ringing such as CES and RAS; there is much merit in encouraging ringers that ring pulli to turn their ringing activities to include nest recording as

well. The emphasis from the BTO so far has also been on projects during the breeding season, though there may be scope for guiding ringers towards more valuable ringing projects during winter, for instance in farmland areas or gardens, particularly if effort is recorded or controlled. A key issue with RAS is the need to monitor a large number of birds at one site means not only that the project is extremely challenging practically, but that ringers need to concentrate on the core areas of the species targeted in order to trap and re-sight enough individuals. However, at the edge of the core area birds may tell us more about survival because the edge-of-range populations often decline first. Consideration should be given to whether smaller RAS sites could yield sufficient data, especially if this meant a wider range of sites could be used. Finally, money could potentially be diverted from the refunds/subsidy budget into funding newly qualified 'C' ringers to start their own project-based ringing.

Volunteers are an enormous resource, and whilst RAS, CES, and NRS are doing well, with some guidance more people could be persuaded into taking part. There are people that are already, in effect, operating a RAS and CES and with little modification could contribute to these schemes. In 2011 it was possible to produce good survival trends for nine species from RAS and another nine species could be added if more data were available. CES currently produces abundance / productivity trends for 22 species, and survival trends for 18. The NRS produces laying data, clutch size, brood size, failure rate and fledgling per breeding attempt for 70 species. The target should be increasing the number of volunteers through increasing education, guidance and, importantly, support for volunteers undertaking these projects which do involve substantial amounts of time, effort and money; for ringing financial help with rings and equipment are also likely to help in guiding effort. We also need to provide clear explanations as to why the standardised method achieves better results. Communication between schemes would also increase volunteer recruitment and involvement: for example between ringers and bird clubs, or volunteer recorders of other taxa. Providing training courses and workshops would also increase volunteer engagement and number, as would feedback to volunteers through appropriate interpretation of the results.

Volunteer Engagement in Monitoring - Discussion

Persuading existing volunteers to change to a different type of project is likely to be a challenge, since many may already have a recording routine. One solution would be to encourage newly qualified ringers to take up a project, hence building a new generation of project-based ringers. Another option would be to concentrate people towards an holistic approach of tackling different aspects of the same species. Encouraging ringers to analyse their data individually would help in engaging ringers with their data and hopefully also in stimulating further data collection as they see patterns emerge in their data. RAS and nest recording could be channelled towards a suite of species, creating a comprehensive integrated approach from the field. In terms of improving survival monitoring, expanding the RAS scheme is likely to be a key priority, though this is likely to require a significant investment of time, especially to encourage people to take part. RAS should also focus on a suite of species from a broad geographic range, to reflect specific environmental drivers, therefore focus is needed on the geographic range and choice of target species.

The possibilities of downscaling the requirements of a RAS or CES were discussed, in particular whether fewer visits or less equally spaced ones would also be useful, but the constraints behind the statistical analyses would make this approach unsuitable for reliable results, and there are insufficient resources at the moment to undertake research into statistical methods that could successfully address the lack of homogeneous standardised effort. Some groups, like seabirds, may benefit from an effort to undertake more general ringing alongside structured approaches, such as RAS, because reporting rates of dead birds are higher. For seabirds in particular, dead recoveries can provide information on the nature and impact of stochastic events such as oil spills or severe storms (leading to 'wrecks' of dead birds). In the future there may also be scope for using new technologies, particularly as prices decrease.

Consideration should be given to increasing effort in farmland habitat as it occupies 70% of the area in the UK and species associated with it continue to decline. Opportunities to investigate the impact of the entry and higher-level agri-environment schemes which have been taken up over large areas of the countryside should be explored. Although resources probably do not allow substantial investment currently, it was noted that winter ringing can also provide useful demographic information, such as the relative frequency of young birds, and information which may help interpret demographic patterns, such as individual body condition.

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27 September 2011