Guidelines for the development of Bird Population Monitoring in Africa

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Abbreviations

BIP  Biodiversity Indicators Partnership
BPM  Bird Population Monitoring
CAP  BirdLife Council for the Africa Partnership
CBD  Convention on Biological Diversity
EBCC European Bird Census Council
GTB  Globally Threatened Bird
IBA  Important Bird Area
IUCN The World Conservation Union
NGO  Non Governmental Organisation
PECBMS Pan-European Common Bird Monitoring Scheme
RSPB Royal Society for the Protection of Birds (BirdLife in UK)
SSG  Site Support Group
TRIM Trends & Indices for Monitoring data
TSC  Timed Species Count
WBDB World Bird Database
**Introduction**

Birds can act as excellent barometers, or indicators, of trends in the state of wildlife and nature, and thus of the sustainability of human use of landscapes and resources. In line with the global BirdLife International Partnership, “Keeping common birds common” is a key objective of the BirdLife Africa Partnership. However, what Bird Population Monitoring there is across the region is not currently standardised nor coordinated, thus precluding synthesis and collation of trend data at regional level. This has been the main motivation for the production of these guidelines, which are meant to capture and synthesize experiences of Partners (both within and outside Africa) with regards monitoring common birds. Specifically, the guidelines:

1. Describe current on-going Bird Population Monitoring efforts in Africa.
2. Present sampling design and survey technique considerations for on-going and ‘new’ schemes.
3. Provide information on what Partners can do to train, enthuse and communicate with participants of such monitoring schemes.
4. Highlight some of the opportunities and considerations for using the monitoring data for advocacy and communication, and
5. Draw attention to some of the key references and sources of additional information related to the subject.

The guidelines are designed to promote consistent approaches to Bird Population Monitoring (BPM) by African BirdLife Partners and their collaborators. However, they also recognise the need to retain flexibility in order to adapt to country-specific conditions. Users should choose, pick and adapt the ideas that follow, providing the resulting data can be fed into the regional monitoring framework. Every situation is different and there is no rigid formula or ‘blueprint’ that will work everywhere.

The guidelines are a product jointly of a Darwin-funded project “Strengthening scientific capacity of conservation NGOs working with the Convention on Biological Diversity, CBD”, (REF 15 – 030) and the 2010 Biodiversity Indicators Partnership (BIP), a project coordinated by United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) with the aim to deliver global biodiversity indicators by 2010. The former was a joint project between the BirdLife secretariat and six national BirdLife Partners across the world, with BirdLife Botswana representing Africa. The principal goal of the Darwin project was to assist national conservation NGOs in developing countries to contribute to the implementation and impact of the CBD, of which biodiversity monitoring was a key component, by strengthening their scientific capacity. As part of the BIP consortium, the BirdLife secretariat and Royal Society for the Protection of Birds, RSPB (including funding from an additional RSPB funding stream) are aiming to produce the first global indicator of populations of common birds.

The guidelines build on the extensive experience of African BirdLife Partners, their collaborators, and on-going schemes outside the continent. In particular, the contribution of the RSPB towards synthesising best practises globally is most appreciated.

### 0.1 Why monitor common birds?

1. In this context, ‘common birds’ refers to species whose population trends, when aggregated together, can be used to indicate trends in the condition of the wider environment. In general, these will be commoner, more detectable, species, and most will probably be placed in the Least Concern category of the IUCN Red List (for which BirdLife is the Red List Authority). However, it may be appropriate to include some threatened species, generally the ones with larger populations undergoing rapid declines.

2. A Bird Population Monitoring (BPM) scheme in the sense used in this document refers to a generic monitoring approach covering a wide suite of common and widespread species (i.e. it is a multi-species approach). This can be used to produce an aggregated population trend as an indicator of the general condition of the habitat in which they are found.
It is widely acknowledged that birds are very useful indicators of biodiversity and the environment, and have been used as such in biological, cultural and social contexts across the world. This is for several reasons. Birds occur in nearly all habitats, often reflect trends in other animals and plants, and are sensitive to environmental change. A great deal of high quality data exists on birds, and new data are realistic and relatively inexpensive to collect. Importantly, birds have a real connection with people and their lives. Work in Europe and North America has shown how wild bird indicators can be successfully used to enhance and improve the management of natural resources, and inform environmental decision-making. This work shows how the fate of bird populations can faithfully reflect wider-scale changes in nature and biodiversity, and thus be used to report upon sustainability of lifestyles (see Box 2). Indicators based upon common bird populations can communicate vital information on habitat changes, driven by both direct anthropogenic habitat loss and modification, and indirect effects, including the impact of climate change. Environmental degradation of this kind may have profound consequences for the lives of people by reducing natural resources and the ecosystem services upon which they depend.

Common bird indicators are especially useful in showing change in the overall condition of ecosystems, which is difficult and expensive to measure directly. More so, we may be facing declines of common bird populations without our knowledge, yet such declines would indicate a fundamental flaw in the way we treat our environment and thus influence the way we behave.

BirdLife Partners in Africa have (through the Conservation programme of the BirdLife International Africa Partnership 2004–2008) committed themselves to ensuring that populations of common birds in Africa are maintained. Under BirdLife’s Global Objective 1.3: “Keep common birds common – reduce the decline in common birds”, the African Partners commit to several activities, including:

**Monitoring activities**

BirdLife’s Global Objective 1.3.1 seeks to “Obtain baseline information and monitor the status of selected bird species at national level (including birds traded in the region; congregatory species; migratory species and water birds)”.

The specific targets of the Global Objective are:

1.3.1a 50% of network to develop and maintain database on common birds (including list of birds traded in the region)

1.3.1b 80% of network have a programme to monitor common birds by 2008

1.3.1c Partners keep the WBDB updated with new information on Africa’s birds and regularly send copies to the BirdLife stakeholders

1.3.1d 40% of network provide annual updated traded species list and associated information to all bird trade relevant stakeholders

1.3.1e Partners participate in bi-annual waterbird counts (African Waterfowl Census – AFWC)

1.3.1f Online Bird Monitoring Programme established in the Africa region by 2007

While some progress has been made towards meeting several of these targets, many challenges remain, particularly relating to target 1.3.1b: “Implementing a Common Bird Monitoring programme”. These guidelines are intended to help with this process.
0.2 The BirdLife monitoring framework: how does Bird Population Monitoring relate to monitoring Important Bird Areas (IBAs) and Globally Threatened Birds (GTBs)?

BirdLife’s monitoring strategy operates at three levels, namely species, sites and habitats, with a monitoring framework and indicators developed for threatened birds, IBAs and common birds respectively.

This is also in line with the goals the organisation has set itself to measure progress towards the BirdLife objectives, as defined in the organisation’s 2004 – 2015 strategy. To date, progress in the BirdLife network is as follows:

1. **Species level**: This involves regularly assessing population sizes of Critically Endangered species, all threatened birds (the Red List Index, see figure below) and population trends of a sample of representative common birds.

   *Red List Index for birds in different biogeographic realms*

2. **Sites level**: IBAs are to be regularly monitored using the “State – Pressure – Response” model, as espoused in the IBA monitoring framework. Under this scheme, focus is on monitoring “trigger” (or qualifying) bird species, which are those that have led to the site

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being recognized as an IBA under any of the global (or, where appropriate, regional) criteria. For situations where a “common bird” species is a trigger species for an IBA (e.g. because it is restricted-range, biome-restricted or congregatory), Bird Population Monitoring could contribute directly to IBA monitoring.

Summary of trends of Kenya’s IBAs 1999-2003

3. Habitat level: In this context, common birds are used as indicators of the conditions of habitats of interest.

The Pan-European wild bird indicator, showing separate indices forest and farmland habitats

Monitoring threatened species, IBAs and common species therefore produces information relevant to local, national and global targets, and also to priorities from local to broad scales, highlighting the importance of Bird Population Monitoring to the realisation of BirdLife strategy.
0.3 Current Bird Monitoring activities in Africa

During the annual meeting of the BirdLife Council for the Africa Partnership in 2006 (CAP 2006), delegates agreed on a need to monitor common birds in Africa. However, it was recognised that a wide range of bird monitoring activities are already ongoing in Africa. It is therefore important, in the first instance, to explore whether there is any common ground with the existing activities (most of them national) that may be built upon them to develop a coordinated system of monitoring common birds in Africa. With this aim, the BirdLife Africa Partnership Secretariat (between August and November 2006) undertook a review of bird monitoring activities in 13 BirdLife network countries in Africa.

This review showed that:

- There is a wide range of bird monitoring activities in Africa, with 80 such activities being recorded during the review. In most cases however, the activities are project-based, isolated, small-scale and in a few cases inconsistent.

- Almost half (46%) of the activities involve monitoring of single species (e.g. particular species of storks, cranes, raptors etc), while 30% involve multiple species e.g. through repeated bird walks, online monitoring, IBA monitoring and birds found in habitats of importance for birds. The rest (24%) involved monitoring particular bird groups e.g. waterbirds, vultures, flamingos, migratory storks and cranes etc.

- The most commonly monitored group of birds are the waterbirds (19% of activities). In some cases, the water bird monitoring activities have a special emphasis on specific groups, e.g. flamingos, herons etc.

- The Shoebill, Wattled Crane and Grauer's Swamp-warbler (threatened species) are the most popularly monitored single species, with each having at least three separate monitoring activities in different places.

- The choice of study species or groups is driven by a variety of factors: level of threat, focus of particular interest groups, ease of monitoring, level of attention that species/group attracts from public, occurrence in IBAs representing unique habitats, need to involve public/members in conservation and training activities, need to gather distributional data from amateur birdwatchers, the species’ beauty and charisma etc.

- Apart from water bird counts, most of the other activities are not coordinated across the continent and thus cannot be easily be pooled together to give an indicator of what is happening on a regional level.

It is worth noting that many of these activities relate to monitoring threatened species (e.g. Wattled Crane, Grauer's Swamp-warbler) and as such feed into BirdLife's Red List assessments, and hence the Red List Index, which monitors the status of birds through their movements between categories on the IUCN Red List. Other activities relate to monitoring of IBA trigger species at particular sites (e.g. congregatory water bird species), and hence contribute to monitoring of the condition (State) of IBAs through IBA monitoring.

However, some activities may be suitable to development and/or enhancement in such a way that would make the data collected more useful for Bird Population Monitoring, as defined here (see Chapter 5).

At the country level, some of the challenges faced by the ongoing bird monitoring schemes include financial constraints, the availability of expertise, the capacity to carry out the required work programme, inaccessibility of some sites or parts of sites (for myriad of reasons), etc. At the regional level, the inability to aggregate data (due to the use of different survey techniques, timing of surveys etc.) is the biggest challenge faced by the African BirdLife Partners. Consequently, to enhance chances for financial, social and institutional sustainability of the Bird Population Monitoring schemes, it is imperative that in the future they be embedded into both core and routine conservation and research programmes of BirdLife Partners, and their collaborators (Governments, Site Support Groups, research institutions, other conservation NGOs etc). All these should be done within the ambit of an Africa-wide Bird Population Monitoring framework, which
would have requirements for coordinated acquisition, storage, handling and communication of Bird Population Monitoring data.

These guidelines are therefore designed to promote consistent approaches to Bird Population Monitoring by African BirdLife Partners and their collaborators. In addition to providing a framework for new systematic, sample-based bird monitoring schemes, they seek to provide guidance on how Partners can adapt existing activities to maximize their utility. The guidelines cover: sample design (Chapter 1), choosing the correct survey techniques (Chapter 2), developing and maintaining a network of volunteer surveyors (Chapter 3), ensuring effective use of monitoring data for advocacy and communication (Chapter 4) and suggestions for enhancing the efficacy of ongoing efforts to monitor common birds (Chapter 5).
1 Sampling design

Whilst fieldwork techniques on how to survey birds are discussed at length in many papers and books (Chapter 2 summarises suitable techniques for surveying common birds in Africa, and Chapter 6 lists further sources of information), consideration also needs to be given to where birds should be counted. Surveys of many species, especially those that are common and widespread, cannot hope to count all individuals of a population, but instead should aim to survey a sample of them. If this sample is chosen correctly, counts (and, in the case of Bird Population Monitoring, trends between repeated counts) can be taken to represent the population as a whole. In practice however, sampling design often involves a compromise between the most scientifically 'pure' approach and the reality imposed by constraints, resources and practicalities.

The basic principle of national (or indeed regional, or supranational) Bird Population Monitoring schemes is for the same sites, spread throughout the area of interest, to be surveyed each year. The survey should cover all species present (or at least all common species) and use a standardised methodology, preferably executed by the same observers between years. Trends in numbers of each species may then be calculated by looking at the between-year changes in counts at each site.

1.1 Sampling Units

How large an area is selected for surveying very much depends on the survey method selected (see Chapter 2). Line transects might be walked across a square 1 × 1km, whereas point counts might be spread over a larger area, and counts made from roads may be many kilometres long. What is essential is that all the units counted in a survey are comparable. The best way to do this is to base them upon regular units, such as grid squares, rather than irregularly shaped sites such as wetlands or particular areas of forest. The use of grid squares has many advantages, particularly in the planning and coordination of schemes, and in the analysis of data.

1.2 Representative sampling approaches

It is important, as much as is practicable, to avoid obvious bias in the selection of sampling units. Such bias might be the selection of only some habitats (wetlands, forest, but not agricultural land or urban areas), only areas that are good for birds (protected areas, IBAs), or geographical bias within a country (sampling only certain regions). One approach that should be avoided, if possible, is that of ‘free choice’. Allowing observers to decide where they survey is almost certain to result in a sample biased towards sites that are good for birds, and interesting and easy to survey. These sites will not be representative of the country as a whole, and counts and trends from them will not necessarily be indicative of trends in biodiversity over the entire country.

1.2.1 Ideal sampling approaches

There are a number of approaches to ensure sampling is representative, with the two that produce the best results being based on either random or regular sampling. Both require the study region (e.g. country) to be divided into standard recording units, as discussed in 1.1, and then a number of units chosen for survey depending on volunteer capacity. A random approach, as the name suggests, selects sites entirely at random from the entire sample, whereas the alternative 'regular' approach, will ensure an even spread of survey sites across a region, and selects survey sites based on a regular grid approach, selecting every 10th, or 100th, (or whatever other proportion is appropriate, as determining by the capacity of a scheme) square from a list of all possible squares in standard order. Both approaches will ensure an unbiased and hence representative sample, although the vagaries of random selection mean that if the sample size is small – which it might well be for new or developing schemes in Africa – there may be biases in regional coverage if the random approach is used.
1.2.2 Pragmatic sampling approaches: dealing with constraints

In reality, it is rarely possible to use the ideal, fully random (or regular) sampling design in a large-scale survey, this being particularly true if a survey is carried out using volunteer surveyors. The practicalities of surveying a site (and making a commitment to doing so every year) interfere; factors such as the remoteness of sites, difficult terrain, lack of transport, and regions with few or no observers all make some sites far less likely to be surveyed by volunteers than others. In such cases, it is better to adopt a more pragmatic approach rather than persevering with a fully random approach and, as a result, getting few squares surveyed.

A semi-random approach allows potential volunteers to identify the general area that they are prepared to survey within. For many, this may be dictated by where they are able to travel to around their home and workplace. They should be encouraged to indicate as large an area as possible, (it may be more than one discontinuous area) and not to tailor this towards areas with particular habitats or interesting bird communities. For example, for those that live in cities, the area in which they are willing to survey should include the city itself, as well as a large an area of the surrounding countryside as possible. Once this area has been selected, a survey site (square) is selected randomly from all those within the area. This ensures that while there may be some biases on a large spatial scale (see 1.3, below), at a smaller scale there is no cherry-picking of better survey sites.

Such an approach has been employed successfully in countries developing new Bird Population Monitoring schemes in Europe, in several ways. These have included volunteers selecting a number of 10 × 10km squares, or a set radius from their home, or identifying the administrative regions (county/state/province etc), that they can survey within, and then being allocated a survey site selected at random from within this area. Observers are strongly encouraged to stick to surveying this square, but if it proves impossible (because of dangerous terrain, for example) then another random selection can be made.

1.3 Dealing with imperfect sampling

Often, for the reasons already outlined, sampling may be unrepresentative of an area, and thus of the bird populations within this area. Nearly all schemes are prone to some bias; even a large scheme such as the UK Breeding Bird Survey, with thousands of volunteers, shows a bias towards lowland areas in the more heavily populated areas of the country. Although it is not possible to deal with all the biases in site selection inherent in semi-random sampling, some major sources of bias can be controlled for in analysis by weighting the results from individual sites. The two most obvious ways to do this are by region, to account for a greater density of survey sites in some areas than others, or by habitat, to correct for unrepresentative sampling of habitats. The latter requires at least a basic assessment of habitat within survey squares, and knowledge of habitat cover over the country as a whole.

1.4 Number of samples

The number of samples surveyed will, largely, depend on both the availability of surveyors, and the method used. As a general rule it is desirable to have as many samples as possible; many samples taken using a quick and easy methods are preferable to only a few with more detailed and time consuming methods. Although longer transects, more point counts, or more Timed Species Counts, will give a better measure of the number of birds at a site, for analytical purposes that site will still be regarded as a single data point (for each species recorded). If it comes to a choice, ten point counts made at two different sites will be preferable to twenty counts made at one site.

1.5 Analysis

Thought must be given to how a dataset will be analysed before a monitoring scheme is launched. Rules may be needed for filtering data to remove erroneous records (for instance, records of species that only occur as vagrants). Data needs to be entered into an appropriate database, and then analyses conducted. In the first year of a scheme, these will be simple descriptive statistics –
the number of species, most frequently recorded species etc. After three or four consecutive years, it will be appropriate to develop species trends, for those more frequently recorded species for which there is sufficient data. The production of trends depends on looking at changes in counts at each site between years, and can be done by a number of modelling approaches. Although these are beyond the scope of this guide (although see section 5.2 for an overview), plenty of support is available, including bespoke analysis software such as TRIM (Trends and Indices for Monitoring data) which is now freely available at http://www.ebcc.info/trim.html.
2 Survey techniques

2.1 The most appropriate techniques for the African context

After deciding where to count birds (Chapter 1), the next step is to decide the method to be used. Again, there are already several publications that discuss in more detail the different techniques used to survey birds (see Chapter 6). The more common methods, and their pros and cons with respect to Bird Population Monitoring are summarized in Annex 1. Considering the cost, ability to involve the general public and generate public appeal, and resource needs (trained personnel, equipment etc.), users should consider choosing one of the following three methods, which are recommended as the most appropriate survey techniques for Bird Population Monitoring in Africa:

1. Line transects
2. Point counts
3. Timed species counts

2.1.1 Line transects

This involves counting birds along a predefined route within a predefined survey/sampling unit (typically a square). A regular approach to placement of the route is ideal, for instance straight transects that run north-south, or east-west, through the centre of a square, or evenly spread out within it if more than one transect is walked.

An ideal line-transect within a pre-defined sampling unit, with bird-recording distance bands shown

In reality however, certain land uses (roads, watercourses etc.) may dictate, or limit access, resulting in modifications to the ideal routes. Indeed, straight lines can be very difficult to establish in many instances. It is advisable that Scheme Coordinators/ Route Organizers should ensure that routes from previous years (or counts) are accessible, and if not, decide on new routes or identify substitutes for sections of transects that cannot be covered, in equivalent habitat nearby. To simplify re-location of the same transect on all subsequent visits, little-used footpaths or small roads that are only very occasionally used by vehicles (less than once per hour) may be useful to delineate routes. These have the added advantage that surveyors spend less time looking at the ground to avoid tripping over, and more time identifying and counting birds.

At its simplest, this technique involves walking along a transect and recording birds (seen or heard) within a fixed distance on either side of the observer. For analysis purposes, it is crucial to decide upfront several factors. These may include, but not be limited to, the following:

a) If recording will be done in units (i.e. counting in sections, such as 200m) rather than totals for the whole transect.
b) When and how to score habitat condition (habitat recording allows Bird Population Monitoring schemes to relate bird numbers to changes in the habitat available to them).

c) If there is any distance beyond which birds should not be counted.

d) The speed with which the transects will be walked, which would be dictated, for example, by ease of traversing the habitat, the number of birds present, and any difficulties in recording these birds.

Ideally, these should be standardised within country schemes, and as much as possible at regional level, although practicality may mean that they might vary between habitats.

Another important consideration is the length of the transect. This requires consideration of whether bird activity is dependent on time of day, and that the quality of data may decline as surveyors become tired. If transects are walked, remember that observers will usually want to end up near where they started, for practical reasons, so a transect going one way followed by another, coming back parallel (but far enough away to avoid double counting) is a good approach.

An example of a Bird Population Monitoring scheme that uses line transects is the UK Breeding Bird Survey ([http://www.bto.org/bbs/index.htm](http://www.bto.org/bbs/index.htm)).

### 2.1.2 Point transects

This technique is different from line transects in that observers stand still at a pre-determined point (census station), and record all birds heard or seen from there.

A point count approach is often preferable when counting less mobile species, and in closed habitats (e.g. forests), where observer mobility is limited. As with line transects, once the sampling unit has been randomly chosen, it is not necessary for the census stations to be randomly selected; if possible, a regular approach that ensures the entire sampling unit is covered is preferable. In fact, compared to line transects, point counts have an advantage of being more accessible, in that you normally seek access to a series of points by whatever route is most convenient, rather than having to follow a set route. However, there are also possibilities to do point counts along transects, whether driven or on foot. Such an approach is used by the North American Breeding Bird Survey ([http://www.mbr-pwrc.usgs/bbs](http://www.mbr-pwrc.usgs/bbs)) and the Coordinated Road Counts in South Africa ([http://web.uct.ac.za/depts/stats/adu/p_car.htm](http://web.uct.ac.za/depts/stats/adu/p_car.htm)), which have volunteers driving routes and stopping every 0.8km and 2km, respectively, to count. Although this has obvious habitat biases (e.g. people may be more likely to stop on a hill rather than a valley), the approach does suffice to capture population trends and might be good for certain situations. Whichever approach is used however, a major limitation of point counts over line-transects is the difficulty in ensuring that exactly the same points are used in successive years. Although this can be overcome by surveyors using reliable GPS units, for most schemes resources would limit this.

*Predefined counting points positioned along a line-transect within a sampling unit*
A grid based sampling strategy (see Chapter 2) is recommended, and the size of the grid would have to be determined by the number of volunteers, ease of moving from one sampling station to the other etc. This may use 1 x 1 km squares (although they may be too small: you cannot fit many points in without the problem of double-counting), 2 x 2 km (often used in Europe.), 5 x 5 km (good, but begins to get demanding in terms of transport), or 10 x 10 km (may be too large, as it would require a large number of surveyors to adequately cover the area).

How many census stations to have in a grid depends primarily on the size of the grid, though most authors and schemes aim for 10 – 20 stations per grid, noting that the precision of the counts (at point stations) can be increased by repeated counts at those stations, although at the detriment of total area surveyed. This balance also has implications for how long the count periods at each station should be: periods of 5 – 10 minutes are widely used. In addition to this time, it is a good idea to have an initial ‘settling in’ period before counting (usually 2 minutes). It will also need to be decided whether all birds seen or heard from a count station will be recorded, or only those within a fixed radius (e.g. 100m, 200m) of the point.

Table 1 summarizes some of the main issues to consider when choosing between point counts and line transects, which relate to effectiveness (i.e. which best provides answers for the questions posed), efficiency (which provides the required data most cost effectively) and appropriateness for the surveyors (which fits the capacity of SSGs, Partners’ membership, Governments etc.).

Table 1. Advantages and disadvantages of line and point transects

<table>
<thead>
<tr>
<th>Line transect</th>
<th>Point transect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatively efficient at low bird densities and in species-poor habitats</td>
<td>Better to use at high bird densities, especially in species-rich habitats</td>
</tr>
<tr>
<td>Good for open habitats</td>
<td>Suits dense habitats</td>
</tr>
<tr>
<td>Suitable for large and conspicuous species</td>
<td>Suitable for skulking or cryptic species</td>
</tr>
<tr>
<td>Suitable for easily accessible areas</td>
<td>Suitable in areas where accessibility is poor</td>
</tr>
</tbody>
</table>

2.1.3 Timed Species Counts

Timed Species Counts (TSCs) are essentially repeated species lists made in a particular habitat (habitats are not mixed, as these usually have obviously different bird communities). However, the main difference from a typical list is that the time when a species is first located (or heard) is recorded. Thus a one hour-long survey (perhaps an appropriate duration for much of Africa; 40 minutes has been used in Kenyan forests) may be divided into ten-minute blocks, and for each species, the block in which it was first recorded is noted. Scores (which could range from 0 to 6) are then allocated for observations in the first 10 minutes (score of 6), next ten minutes (score of 5), and so on until a score of 0, which is given to species not recorded within that hour. These TSCs are then repeated as many times and as widely as is possible within the habitat, and for each species the mean score across all 1-hour counts gives a relative measure of abundance. The assumption is that the more common species will be recorded more frequently and quickly, and so would have a higher cumulative score. Often, surveyors are allowed to wander everywhere, but it is also possible to designate a fixed route (randomly selected), which may be more useful in terms of repeated observations along a specific stretch of a particular habitat. Consequently, if habitat conditions along that stretch are also recorded, the TSC scores could then be correlated to any observed habitat changes.

The results of TSC should be interpreted with caution, because the scores of each TSC event (i.e. a score 6, 5, 4, 3, 2, 1, or 0) measure relative abundance of a species at that time, and a cumulative score of these over several sites and deduction of trends from these indices over years (or repeated counts) is not just the arithmetic sum (see Chapter 6).

The suitability of these techniques for the various bird groups is summarised overleaf.
Table 2. Suitability of point counts, line transects and Timed Species Counts for various bird groups in Africa (Adapted from Gibbons and Gregory 2005).

<table>
<thead>
<tr>
<th>Method</th>
<th>Waterbirds</th>
<th>Wading birds</th>
<th>Raptors</th>
<th>Gamebirds</th>
<th>Passerines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point count</td>
<td>*</td>
<td>*</td>
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</tr>
<tr>
<td>Line transect</td>
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<td>**</td>
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<td>**</td>
</tr>
<tr>
<td>Timed Species Count</td>
<td>*</td>
<td>*</td>
<td>**</td>
<td>**</td>
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</tr>
</tbody>
</table>

* Method usually applicable

For waterbirds and waders it is best to use the procedure adopted by Wetlands International for the International Waterbird Census [http://www.wetlands.org/articlemenu.aspx?id=4fd46081-1f96-4fb0-900a-7332a1a1a49b].

In open habitats, raptors can often be reliably counted from a vehicle, allowing many km’s to be covered.

2.2 Considerations for all three approaches and general points

It is important to note that all three techniques are highly influenced by detectability; counts will be a lot lower for small, cryptic, quiet species than for large obvious vocal ones present at a similar density, and likewise habitat will also have an impact. Repeated (ideally annual) monitoring at the same sites and using the same methods however will allow an unbiased relative change between counts to be measured. The difficulty in detecting some species may mean, however, that they are recorded insufficiently frequently for adequate data to be collected to monitor trends.

These techniques also provide for estimating densities (and therefore population estimates), through the use of ‘Distance sampling’ – a specialised technique that takes into account that detectability of a bird decreases with distance from the transect or point, and estimates densities by modelling influence of habitat, approximate distance between the bird and the recorder etc. (see Chapter 6 for references). Although ‘distance sampling’ is relevant for population estimates, it is not required for trend analyses. However, if surveyors can handle the added complexity of recording in distance bands away from a transect or point, then this can be incorporated into the surveying, as it maximises utility of the data collected. Unless surveyors are equipped with range-finders, distances will have to be estimated in pre-determined distance bands.

It is important to highlight that once a technique (line transects vs. point transects vs. TSC) has been selected, there will be other considerations that scheme designers will have to decide on. The list below is doubtless not exhaustive, but provides some of the issues to consider:

- How often to do counts? For points and lines, multiple visits are desirable, as it is easy to miss birds or get unusual counts etc with just a single visit. Many European schemes use two visits per annum, and take the highest count from either visit for each species for analytical purposes. Experience in Uganda has shown that two TSC’s per site per year can also give robust results.

- When to do the count? This will depend on the country – e.g. what time of year is it best to catch maximum breeding activity or when birds are most readily detected. Consideration will need to be given to seasonality, for instance with Afro-tropical/Palearctic migrants, or with the wet/dry season. For some tropical countries, it may be best for counts to cover the whole year (2 counts 6 months apart, 3 counts 4 months apart, 4 counts 3 months apart…).

- Whether to count all species, or restrict observations to a shorter list? In many countries, the large number of species is a problem, and only a few observers could be relied on to recognise them all to an acceptable level of accuracy. Restricting observations to a fixed, but shorter list can make a scheme more accessible and feasible, additionally allowing it to be tailor-made to specific audiences, depending on their capabilities, use of the data etc. Restricting the number of species observed
however is generally not as good since it restricts the scope of the scheme, does not record potentially valuable data and is therefore not future-proof.

- Time of day? Although morning is generally better due to higher bird activity, this requirement may have to be relaxed given travel needed to sites.

- Sample size? Scheme designers should remember that sample size is very important, so when considering the trade-off between more accurate, larger, comprehensive counts for each sample, or more samples, it is generally better to go for the larger sample. If making counts easier or less demanding means more volunteers, or each volunteer covering more samples, then that should be the preferred option. For point counts, however, if many individual counts are made at a site, they all simply contribute to one data point in the analysis, so doing ten counts at two sites is more valuable than twenty at a single site.

Experience from Europe shows that as long as national Bird Population Monitoring schemes are systematic and their design scientifically robust, it is generally not problematic to collate data at the regional level, despite the use of different methods at country level.
3 Running a Bird Population Monitoring scheme – the practicalities

Once the sample design and survey techniques have been decided for a Bird Population Monitoring scheme, careful consideration has to be made of the practical considerations of running the scheme. As the employment of professional surveyors is rarely possible, such projects rely on volunteer observers. Hence, it is vital that good management practices are employed to recruit and retain volunteers by ensuring their involvement with the scheme is enjoyable and rewarding. In addition, it is important to ensure that there is sufficient support, guidance and training so that the data collected is robust and reliable.

3.1 Recruiting

The issue of recruiting scheme coordinators and surveyors for Bird Population Monitoring is closely tied to that of recruiting support for many other conservation projects and the work of BirdLife Partners in general. Often, Bird Population Monitoring may compete with other projects for the time of potential participants. Where possible, the design phase should be led by someone with extensive field experience, as their knowledge would prove very useful, especially if much of the requisite information on species richness, fine-scale distribution etc. is undocumented. Coordinators can then engage with potential volunteers (including members of Partners, in liaison with the person who deals with general membership issues on behalf of the Partner, if there is one). This would of course have to be done in consultation with coordinators of any other ongoing monitoring schemes within each country (see 5.2.2).

3.2 Training

Good training is an essential component of a successful Bird Population Monitoring scheme, in order to build capacity for designing surveys, managing volunteer networks, analysing data, communicating results and using them for advocacy. This is likely to involve both face-to-face training (workshops) and the dissemination of training materials. Training workshops should aim to:

- Describe the rationale behind establishing a national Bird Population Monitoring scheme, and its value for conservation
- Give a basic grounding in survey design and methods
- Cover the field method to be used in the scheme fully
- Include sessions on identification, filling in forms correctly, health and safety issues
• Use a mix of practical and theoretical sessions, and opportunity for volunteers to exchange experience and opinions.

To cover all these aspects fully, a two-day (at a minimum) workshop involving the coordinators, Partner staff, potential key surveyors, Government counterparts etc. is recommended as early as possible at the commencement or development of a scheme. Thereafter, similar workshops should be held when needed (but at least once a year), with participants drawn, as appropriate, from SSGs, Government departments, schools, wildlife clubs, Partner membership and all stakeholders currently involved in any other ongoing bird monitoring initiatives. Potential surveyors are most likely to be people already involved in Partners’ activities and programmes, although Bird Population Monitoring schemes provide a way of engaging with other constituencies. At the regional level, CAP offers an excellent avenue to share experiences with colleagues in the BirdLife network, and get feedback on how the schemes could be improved.

3.3 Supporting materials

As stated previously, Bird Population Monitoring schemes should aim to recruit as many observers as possible, and hence Partners may consider targeting those members of the public with limited surveying experience, or even a relatively limited birdwatching experience. This therefore means that sufficient materials need to be produced to facilitate the active participation of such people, reducing errors (e.g. bird misidentification) and bias (e.g. facilitating the participation of more people enables more area to be covered during surveys, increasing accuracy in the methods used). Some of the materials that could help with this include:

• **Data capture forms** – which should be easy to read and allow for all the required data to be recorded on them in the field

• **Survey protocols** – which would describe the full detail of the methods to be used so that everyone understands what is to be done, and data collection is consistent

• **Field guides** – if these are too expensive then modified identification kits illustrating only the species most likely to be encountered can be considered.

• **CDs** – these could contain additional information (reports, scientific articles, case studies) so that those who need additional information on Bird Population Monitoring can easily access it. Such a CD has been compiled to accompany these guidelines, and country-specific materials (e.g. district maps, road networks etc.) can be added.

• **Posters, leaflets, brochures etc** – to provide as much information as is possible for the many stakeholders involved.

If appropriate, local and vernacular names can be included in these supporting materials to facilitate greater use of the resources.

3.4 Incentives

Recruitment and retention of volunteer surveyors may be greatly helped by offering incentives. However, this can pose problems for long-term sustainability through raising expectations. Analogies can be drawn with Site Support Groups (SSGs), whose sources of motivation will vary from site to site, though generally, they appear to be keen to engage in activities that have significant impact to themselves and the community5. The greatest motivation to individual SSG members seems to be achievement of the goals and aspiration of the members as a group. In many cases, members are motivated by:

• Activities that build their individual capacity; training in bird identification, skills for income generating projects, etc.

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5 *Guidelines for the establishment of Site Support Groups in the conservation of the conservation of IBAs in Africa*. BirdLife International.
• Activities that earn the group local, national and international recognition and acclaim.

• Opportunities to travel and see what other people are doing.

• Activities that create avenues for members to make a living for themselves or advance their careers.

• Opportunities to deploy traditional knowledge and skills possessed by SSG members.

It may be appropriate to build Bird Population Monitoring into SSG programmes and other volunteer networks already associated with the Partner e.g. its membership, and to do this in a way that takes account of the points listed above and others that may be specific to the volunteers (e.g. a school wildlife club) in order to enhance the prospects of sustainability.

3.5 Contact

Although time-intensive, when it comes to maintaining the interest and involvement of volunteer surveyors there is no substitute for regular personal contact. This is particularly true for small, new schemes were every observer is very valuable. When schemes grow and the numbers of observers increase, it is worth considering establishing a network of regional coordinators, each with the responsibility for maintaining contact with observers within their region. If Bird Population Monitoring activities are woven into membership activities, those surveyors who are also members may have greater contact and communication with Partner staff, and monitoring may provide a means through which to promote membership. Where personal contact is not possible, it is important that other forms of communication about the scheme (see 3.6 below) reach surveyors.

3.6 Reporting

The results of Bird Population Monitoring schemes should be reported as promptly as possible, and to as wide an audience as possible. Four distinct audiences can be identified, all of which may require targeted communication: volunteers, the wider conservation community, the government, and general public. The latter three are discussed in section 4.2. In this context, a volunteer refers to those individuals who participate (directly e.g. field surveyors, or indirectly e.g. facilitating access into their private property) in Bird Population Monitoring.

Because these volunteers are the mainstay of the scheme, it is important that at the onset, a comprehensive communication plan is drawn to explore avenues for reaching all of them, as frequently and consistently as is possible. These means of communication do not necessarily have to be new publications (which may incur additional costs), and could include for example, sections devoted to Bird Population Monitoring in newsletters, websites, annual reports, brochures etc. Data capture forms, methodology used, volunteer feedback, and a Questions and Answers segment can be included, to personalise communication with the volunteers and enthuse them even further.

3.7 Maintaining involvement

It is vital for schemes to retain existing volunteers; it is far harder, and resource-hungry, to attract and train new surveyors than it is to retain those already involved. However, without frequent contact and regular reporting as suggested above, volunteers may desert schemes. Consequently, it is important to maintain a two-way communication stream, making certain that feedback from surveyors (who are volunteering their time, energy and other resources) is as much as is feasible incorporated into the monitoring scheme. Volunteers need to be encouraged that the scheme they contribute to is important and valuable, and that their own individual contribution is valuable. If reports using the data are published and widely disseminated, they can be used to motivate for real change (e.g. see Chapter 4), with volunteers being more likely to show loyalty and support the programme.
3.8 Helping a scheme to grow

Often new national Bird Population Monitoring schemes start by recruiting experienced observers known to the organisers. Although there is often competition between projects for the valuable skills, time and effort of such observers, if the objectives of the scheme are explained such skilled observers are highly likely to participate. It is worth highlighting the schemes relationship with the other Partner programmes, including IBA monitoring, threatened species work and membership activities. Additionally, the participation of skilled observers often provides the opportunity to gather valuable feedback on the scheme, which may be incorporated into the survey design. If necessary, in the early stages of the scheme (after the end of the first year for instance) this may lead to a revision of techniques to accommodate their concerns without compromising the robustness of the scheme.

To increase this constituency, Bird Population Monitoring may be linked to membership activities (e.g. walks, environmental education and outreach programmes etc.) and other ongoing monitoring initiatives (see 5.2.2 for some options). An advantage that Bird Population Monitoring has over some other monitoring programmes is that although observers must be capable of identifying birds, it requires less prior ecological or scientific knowledge, therefore providing an opportunity to recruit members who may be new to, or less experienced in carrying out bird surveys.
4 Using monitoring results for advocacy and communication.

4.1 Communication challenges

In common with other programmes and activities of the BirdLife Partnership in Africa, Bird Population Monitoring programmes face a number of communications challenges:

1. **Low awareness** at local, national and international levels about the efforts of the BirdLife Africa Partnership.

2. **Financing** for communications, education, and information activities is often sub-optimal in programme budgets.

3. Those who have experience are **not always able to share** it with others, because of physical distance, skills limitations, and other blockages.

4. **Low levels of knowledge about birds** and their habitats and importance at all levels of administration and governance in general and in natural resource governance.

5. **Environmental education is weakly covered in formal schooling** and higher education curricula.

6. **Local knowledge is often suppressed in favour of “scientific” data** and the two are not adequately combined to make meaningful appropriate engagements.

7. **Low and limited access to electronic IT tools and their management** - for many stakeholders to communicate

8. Inadequate numbers of **suitable personnel** is a major concern for most BirdLife Partners in Africa.

While there is no blueprint for how these challenges can be overcome (due to variation in socio-political contexts, Partner capacity etc), Partners can learn from each other’s experiences. Box 1 provides some examples from Botswana.
Box 1. Communicating about common birds in Botswana.

In its short history since recruiting professional staff (the first member of staff joined in March 2004, and as at October 2007, it had 7 full-time staff members), BirdLife Botswana has been working towards increasing the profile of common birds in Botswana. This has been achieved through several means, including:

1. **To tackle low awareness on birds** – the organisation published a bi-lingual (English and Setswana – the vernacular) book in 2005. This publication documents 200 of the more common birds in the country, with a full colour photo, Setswana, English and scientific names, and descriptions in English and Setswana for each species. Copies of the book have been availed free-of-charge to schools, government departments, conservation NGOs etc. to improve their general knowledge of the common birds in Botswana. However, the book is also retailing so as to generate additional funds to support communication and awareness-raising, especially in schools.

2. **Birds and national policy makers** – Concerted efforts have been made to ensure that data relating to Bird Population Monitoring reaches the appropriate government authority. This was achieved through several ways including reserving ex-officio positions on our Board of Trustees for the Department of Wildlife and National Parks (wildlife authority) and the Department of Environmental Affairs (CBD-focal point). Both departments are represented by senior management, who are then privy to all programmes and data relating to common birds (e.g. Botswana Tickbird, [www.worldbirds.org/v2/botswana.php](http://www.worldbirds.org/v2/botswana.php)), and then facilitate update by government, concurrently advising BirdLife Botswana to restructure their programmes to better fit with new or planned government projects, programmes or policies. Through this avenue, BirdLife Botswana has been acknowledged as a ‘node’ on Botswana’s Clearing House Mechanism, as an accredited data provider for the District State of the Environment Report process (the only non state actor), and the soon to be launched National Environmental Information Management System (NEIMS).

3. **Shortage of staff** – this predicament has been tackled through hosting qualified volunteers e.g. a Japan International Cooperation Agency (JICA) policy expert. The JICA scheme provides for an attachment of Japanese professional for up-to-2 years ([http://www.jica.go.jp/english](http://www.jica.go.jp/english)), and in our case, the policy expert assisted in reviewing BirdLife Botswana programmes and plans to ensure conformity with national, regional and global policies and thinking and helped explore opportunities offered by some of these mechanisms (see 4.2 for examples of forums relevant to Bird Population Monitoring). Admittedly, considerations need to be made when recruiting volunteers (primarily supervision time), but for most Partnersth benefits would far out weigh the costs, and this is an option to explore in efforts to promote Bird Population Monitoring and link the results thereof to broader policy processes at country and regional levels.

Partners can also ensure Bird Population Monitoring results are used effectively by providing regular feedback (to their members, volunteer surveyors, collaborators etc) and by proactively engaging with policy makers and the general public through regular talks, participation at strategic workshops and meetings, regularly updated websites, newsletters etc. Partners are more likely to mobilise financial, technical and moral support for these activities by placing emphasis on what the **results** of the Bird Population Monitoring scheme mean in the broader context e.g. impacts on livelihoods, links to Millennium Development Goals (MDGs) etc., rather than on concentrating on enhancing the scientific robustness of the data collection **process**, at least initially. This means that Partners should consider prioritising the needs of end users because without their support, the monitoring is unlikely to be sustainable in the long term.

### 4.2 National, regional and global forums where Bird Population Monitoring data is useful

To maximise support from national stakeholders (especially statutory institutions), whether financial, technical, statutory, moral or publicity, it is important that Bird Population Monitoring schemes feed into national priorities (for example, National Biodiversity Strategy and Action Plans, or national reports to Conference of Parties for relevant Conventions). Consequently, at the onset,
it is important to identify potential national end users of the data, and ensure that their concerns and needs (relating to general biodiversity indicators) are adequately addressed by the scheme. These would include government departments, particularly those responsible for habitats and wildlife, especially those reporting to Multilateral Environmental Agreements.

There are also several forums where Bird Population Monitoring data will be useful at the regional and global scales. In this respect, the regional and global BirdLife secretariats may be best placed to promote the use of Bird Population Monitoring data.

*At the regional level these include:*

- Regional groupings e.g. Southern African Development Community (SADC), Economic Community of West African States (ECOWAS) etc.
- The African Union (AU)
- New Partnership for Africa's Development (NePAD), especially its sub-regional Environmental Action Plans
- African Ministerial Conference on the Environment (AMCEN)

*At the global level these include:*

- Multilateral Environment Agreements e.g. CBD, the Convention on Migratory Species (CMS), the Ramsar Convention on Wetlands, the African-Eurasian Waterbird Agreement (AEWA) etc.
- The RSPB/BirdLife Global Wild Bird Indicator Project and the WWF Living Planet Index
- Donor agencies (e.g. Global Environment Facility)
- Bilateral agencies, etc.
The use of Bird Population Monitoring data in the UK and elsewhere in Europe.

Bird Population Monitoring in the UK underpins a huge amount of the work of the RSPB (BirdLife UK) and the work of other conservation organisations, both non-governmental and governmental. The UK Government part-funds bird population monitoring, and uses the results to identify the priority species for targeted conservation action as part of the UK’s Biodiversity Action Plan (one of the country’s main policy responses to the CBD). Results, in the form of indexed species trends, are reported annually. Over the four decades since monitoring began, a number of common species have become high conservation priorities due to massive population declines; Tree Sparrow, *Passer montanus*, has declined by 90% since 1970, for example, and two formerly common and widespread species, Wryneck *Jynx torquilla* and Red-backed Shrike *Lanius collurio*, have gone extinct as UK breeders.

As well as helping to identify conservation priorities (25 of the UK BAP’s 59 species are common and widespread species monitored by BPM), analyses of BPM data can shed light on drivers of decline and, in combination with other research, identify remedial action to halt and then reverse such trends. For example, the decline of a suite of farmland birds in the 1970s and 80s has been linked to a widespread intensification of agriculture over that period (high pesticide use, moves to monocultural farming, loss of non-farmed land etc). Research has identified appropriate policy responses action (such as subsidies paid to farmers to farm in a wildlife-friendly manner), and continued monitoring will allow the response of populations to this action to be followed.

The first wild bird indicators for the UK were compiled by the British Trust for Ornithology and RSPB in 1999, for the UK government. By creating a single composite indicator from a large number of separate species trend indices, such wild bird indicators present high-level “headline” indicators of broad trends in wild birds and hence the wider environment. They can be disaggregated to report on just certain habitats; in the UK, we now produce separate indicators for birds of farmland, woodland, urban areas, wetlands and coastal/marine habitats, amongst others. These indicators are valuable tools for communicating the state of the natural environment to a wide audience, and can be used to measure progress towards policy targets both national and international (i.e. CBD). For example, the UK government has adopted a target for England as part of its Public Service Agreement, to ‘care for our living heritage and preserve natural diversity by reversing the long-term decline in the number of farmland birds by 2020, as measured annually by underlying trends’. Progress towards this target is measured using an indicator based on farmland bird trends within England, with the goal being for this indicator to start moving upwards after many years of decline.

The development and success of wild bird indicators within the UK, as powerful tools for communicating the health of wild bird populations and the wider environment, has led to the construction of a wild bird indicator for Europe by the Pan-European Common Bird Monitoring Scheme (PECBMS), a partnership led by the European Bird Census Council (EBCC), the RSPB, BirdLife International and Statistics Netherlands. This is the first genuinely policy-relevant indicator of biodiversity for Europe, and the farmland bird indicator has been adopted by the European Union as a Structural and Sustainable Development indicator. The indicator takes data from annual bird population monitoring programmes across Europe and combines them, firstly to produce pan-European indices of individual species and then to produce multi-species indices. Presently, 18 different countries contribute to the indicator and this number will continue to grow with the ongoing establishment of monitoring schemes in countries such as Portugal, Bulgaria and Lithuania.
5 Developing, enhancing and expanding Bird Population Monitoring in Africa

5.1 Aspirations for global Bird Population Monitoring

The BirdLife International global secretariat, in partnership with RSPB, are facilitating the development of a global Wild Bird Indicator as part of a consortium of organisations attempting to deliver global biodiversity indicators under the umbrella of the 2010 Biodiversity Indicators Partnership (2010 BIP). This builds on the success of national multi-species Bird Population Monitoring schemes in Europe that form the Pan-European Common Bird Monitoring Scheme (PECBMS), and the desire of regional Partnerships such as CAP to roll out Bird Population Monitoring outside Europe. By assisting the start-up of new Bird Population Monitoring schemes in Africa, and enhancing existing monitoring efforts, it is hoped to combine Bird Population Monitoring data from Africa, Europe, North America and elsewhere to produce the first global indicators for common birds. Although at first there will be major gaps in the monitoring network, in time it should be possible to create an increasingly robust indicator.

5.2 Indicator development

The Global Wild Bird Indicator Project aims to collate population trend data from annually operated national BPM schemes throughout the world. Development of the global Wild Bird Indicator will focus on population trends of widespread birds, with the aim of promoting birds as ‘indicators’ of the state of the global environment.

Although national monitoring schemes may vary, as long as data is collected in a standard way it should be possible to combine data from diverse monitoring schemes to produce robust global indices.

There are several stages in indicator development:

5.2.1 Selection of species

Whilst an indicator could be developed which groups all species together, it is often more sensible to group habitat specialists. A sensible grouping might therefore separate out groups for woodland and forest from those found in agricultural and grassland habitats.

5.2.2 Calculation of national trends

The freely available software package TRIM (TRends and Indices for Monitoring data) has been developed for analysis of count data obtained from monitoring wildlife populations. TRIM allows yearly indices and trends (with standard errors) to be calculated by way of log-linear Poisson regression, with corrections for over-dispersion and serial correlation. The analyses allow for plot-turnover, and missing counts from sites are estimated from other sites within the same country, and (wherever possible) from sites with similar characteristics.

<table>
<thead>
<tr>
<th>STEP 1.</th>
<th>TRIM 1. run</th>
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<tbody>
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<td>site 2</td>
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<td>etc.</td>
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5.2.3 Calculation of 'supranational’ species trends

Supranational indices for species are produced by combining national indices, weighted by the national population size of each species. This means that changes in larger populations have a greater influence on the overall trend. Although national schemes may differ in count methods in the field, these differences do not influence the supranational results because the indices are standardised before being combined. Similarly, the fact that national schemes may have been running for different lengths of time may mean that there are missing year totals. However, TRIM is able to estimate these based on values from neighbouring countries in the same region.

Supranational multi-species indices (indicators) are produced by averaging indices (rather than abundances).

### STEP 2. TRIM 2. run
(weighting by population sizes)

<table>
<thead>
<tr>
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5.2.4 Combining supranational species trends into multi-species indices

Supranational indicators are then combined on a geometric scale, to create multi-species indicators. Thus, an index increase from 100 to 200 is equivalent, but opposite to a decrease from 100 to 50. The method allows each species to have equal weight in describing the average trends of constituent species. If more species decline than increase, each at the same rate, then the index goes down, and vice versa. Thus, such a composite indicator reflects the balance of population trends. Indicators such as this are sensitive to a number of different potential drivers and/or pressures, becoming a barometer of environmental change on a large scale, and acting as surrogates for changes in nature more broadly.

### STEP 3. TRIM 3. run
(weighting by population sizes)

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5.3 Rolling out Bird Population Monitoring in Africa

In the short-term, it is envisaged that rolling out Bird Population Monitoring in Africa, will involve three complementary approaches:

1. Enhancing current monitoring activities to increase their utility for Bird Population Monitoring

2. Initiating pilots of ‘new’ Bird Population Monitoring schemes based on randomised surveys (as described in Chapters 2 and 3) in 2 - 3 countries.

3. Promoting WorldBirds to collect list-based data for monitoring common birds

5.3.1 Enhancing existing bird monitoring

Existing bird monitoring schemes in Africa, as recently reviewed (section 0.3), can be broadly placed into six categories. Here, the suitability of each of these for Bird Population Monitoring
purposes is reviewed, and brief recommendations are made on how (and if) they can be modified to contribute to Bird Population Monitoring. Whilst none of the approaches are as suitable as properly designed multi-species generic surveys as described in Chapters 1 and 2 and in section 5.2.1 of Chapter 5, in some cases they may provide a good starting point for a full Bird Population Monitoring scheme.

<table>
<thead>
<tr>
<th>Type of monitoring</th>
<th>Current suitability for Bird Population Monitoring</th>
<th>Potential for improvement/adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single species surveys/monitoring, often on large conspicuous species such as cranes, storks, eagles.</td>
<td>Not suitable – trends in a single species cannot be treated as representative of trends in wider biodiversity. May be important for GTB and IBA monitoring however.</td>
<td>May form a building block towards Bird Population Monitoring, by training and enthusing potential participants in a future Bird Population Monitoring scheme. Could be expanded to cover more species.</td>
</tr>
<tr>
<td>IBA/protected area monitoring.</td>
<td>Not ideal, as biased towards areas not representative of the wider countryside.</td>
<td>Such schemes may monitor a wide range of species in a robust manner. If coupled with an additional element of sampling outside of protected areas, may form solid basis for national Bird Population Monitoring.</td>
</tr>
<tr>
<td>Single species research, which involves some element of counting alongside more in depth ecological studies</td>
<td>Not suitable – trends in a single species cannot be treated as representative of trends in wider biodiversity. May be important for GTB and IBA monitoring however.</td>
<td>Often specialist, professional-led research: unlikely to be of relevance to Bird Population Monitoring.</td>
</tr>
<tr>
<td>Waterfowl surveys</td>
<td>Habitat biased, species-group biased, and often on non-breeding birds. May be important for IBA monitoring at wetland IBAs however.</td>
<td>Waterfowl data itself not useful for Bird Population Monitoring, but potential for Bird Population Monitoring schemes to be established using existing network of waterfowl counters.</td>
</tr>
<tr>
<td>Migration studies</td>
<td>Not suitable – Bird Population Monitoring is focussed on breeding birds: trends in migrants may not reflect environmental changes within country. May be important for GTB and IBA monitoring however.</td>
<td>Little scope, other than for raising awareness and capacity for bird monitoring.</td>
</tr>
<tr>
<td>Bird walks</td>
<td>Do not collect data in a rigorous fashion, and often cover only one or two non-randomly selected sites.</td>
<td>Data from bird walks could contribute to measuring trends via list frequency (see 5.2.3, below). Alternatively, data could be collected in more rigorous fashion, e.g. Timed Species Counts (2.1.3), although number and spread of counts would need to increase.</td>
</tr>
</tbody>
</table>

So, in summary, projects currently focussed on single species monitoring should be examined to see if they could be expanded to cover multiple species, those on certain areas or habitats considered for expansion to cover a representative sample of habitats and areas, and those covering multiple species but in an ad-hoc, non-standard manner could benefit from a more rigorous standardised approach, particularly if coverage can be expanded to more sites. In a few cases, it may be possible to use data from existing schemes to contribute towards a Common Bird Indicator, despite biases, with the intention that these are enhanced and expanded in time, or superseded by data from other sources: this would have to be assessed on a case by case basis.
Many current schemes are not of direct relevance to Bird Population Monitoring efforts as they are designed and conducted for other survey and monitoring purposes, and others are not amenable to Bird Population Monitoring as they were never intended to be. This is not to say they are without merit. Some have been designed and are conducted for other conservation purposes, many contribute to monitoring of GTBs, others contribute to IBA monitoring (through monitoring trigger species at IBAs, other monitor the condition of migration routes etc., and all participatory monitoring serves to engage people in birdwatching and monitoring activity, and raises willingness to support and participate in conservation action.

5.3.2 New Bird Population Monitoring schemes

National Bird Population Monitoring schemes require resources: manpower to oversee schemes, funding to cover costs, and, most crucially, observers willing and able to survey sites. Some African Partners may find that it is some time before they are in the position to attempt launching such a scheme. For others, it may now be feasible. In this section, the minimum commitment and resources required are outlined.

The list below details the minimum resources necessary to launch a Bird Population Monitoring scheme, based on experience in Europe. Some resources, both financial (limited) and in the form of assistance in the development of schemes from RSPB and BirdLife secretariat staff, are available to support Partners in setting up schemes. However, it is important that these start-ups are only attempted in countries were there is a significant chance of success both in the short term, and in the scheme being sustainable in the long term. To that end, Partners should be able to meet most if not all of the following requirements, with some global/regional support:

a) Sufficient experience in running nationwide projects

b) Sufficient staff resources to ensure that schemes are well run, with attention to handling sampling design and volunteer surveyors as outlined in Chapters 1 and 3.

Specifically, the ability to:

- Design an appropriate monitoring scheme.
- Produce survey instructions.
- Produce survey forms.
- Recruit and retain volunteer observers.
- Run training workshops – potentially two in the first year of survey and one per annum subsequently.
- Maintain close contact with volunteers to ensure that surveying is done as expected, where and when as expected.
- Collect data from observers and collate in a basic electronic database
- Perform simple analyses on monitoring data.
- Report survey results in a timely and suitable fashion, including an annual newsletter for observers.
- Work to ensure sustainability of the scheme in the long-term.

Although circumstances will differ between countries, it is suggested that at least one part-time staff position would be needed to achieve this.

Schemes should be able to survey a minimum of 20 survey sites in the first year of surveying, with the goal of covering 40 sites within 2 or 3 years. Again, circumstances will differ between countries, but it is suggested that this would require ca. 40 man-days of volunteer effort.
5.3.3 Collecting list-based data using WorldBirds

The Worldbirds programme (http://www.worldbirds.org/) is jointly run by BirdLife, RSPB and National Audubon (BirdLife in the USA). It brings together a worldwide ‘family’ of internet-based systems for collecting information from birdwatchers on the species they have seen. Although global in scope, each country participating does so with self-determination, building up local interest, skills and institutional capacity.

In addition, many amateur naturalists and environmental professionals travel the world to view birds recreationally or for work. Much of the information that these individuals record remains in personal notebooks or databases/spreadsheets. These data amount to a vast collection of knowledge – a huge untapped resource that could make a valuable contribution to monitoring birds.

Users who register with a Worldbirds system can store and manage their own birdwatching observations, extract reports and view, print or download maps, all using their own language. They can explore different locations and find out which birds have been seen and when/where they were recorded. As well as contributing their own observations, users are able to view others’ records, which may influence their next bird-watching trip. Checklists keep track of sightings and can be easily downloaded for taking out into the field.

Worldbirds was first launched in Kenya in 2004, with Kenya Birdfinder trialling software and methodologies. The site now has more than 450 registered users who have provided 2130 visits, covering almost 100,000 bird observations (as at September 2007). After further development, the core system was rolled-out to several European and American countries, and also to Botswana, where Botswana Tickbird has 110 users, 1400 visits, and 90,000 bird observations (many of these being atlas counts that are now available to the public).

By the end of 2007, a Southern Africa ‘hub’ will be implemented, covering nine countries. A ‘hub’ is a single installation of the software that enables several countries to share the underlying database, each having its own entry portal and data ownership, while allowing data to be extracted from several countries at once. Associated benefits to this approach include the ability to bring countries on-line where there is no BirdLife Partner, as well as keep the system interesting for users from countries where there may be less bird-watching activity. By summer 2008, four more hubs will be launched in Africa (East, North, West, Indian Ocean Islands), covering the whole continent and enabling bird watchers anywhere to participate.

With the successful roll-out of Worldbirds, BirdLife Partners will benefit not only from the existing software (which includes specially developed Atlas screens), but also all future developments, including, data import, and Important Bird Area monitoring links and increased ability to capture and analyse “day-lists”.

It should be possible to use the data collected through Worldbirds to contribute to Bird Population Monitoring. The methods for doing this are still being developed, but they are based on the assumption that changes in the abundance of a species should be reflected in the frequency with which it is recorded on birdwatcher’s lists of species seen during a visit to a site. To overcome the many biases associated with the type of data Worldbirds collects, large datasets will be required, and users should be encouraged to compile comprehensive lists of all species seen at a site (not just the more interesting ones). Further research and development will lead to more detailed recommendations (and probably modifications to the software and user interface) in order to improve the utility of Worldbirds and the data entered for Bird Population Monitoring.
6  Suggested Reading and further sources of information

6.1  Survey design and fieldwork methods


http://www.earthwatch.org/atf/cf/%7BF4CFBC9F-3318-4DA3-B3FB-DA8C81855CB%7D/African_forest-english.pdf


6.2  Analysis


6.3 Software

TRIM – an easy to use software package for producing species population trends from monitoring data, is freely available to download from Statistics Netherlands:


Distance – a software package for estimating bird density (and hence population size) from either transect or point count data can be downloaded, for free, from the Research Unit for Wildlife Population Assessment at St Andrew's University:

http://www.ruwpa.st-and.ac.uk/distance

R - For general statistical analysis, the powerful program R is freely available from

http://www.r-project.org/

6.4 Reports on/examples of existing monitoring schemes

The UK Breeding Bird Survey

http://www.bto.org/bbs/index.htm

The North American Breeding Bird Survey

http://www.mbr-pwrc.usgs.gov/bbs/ 

6.5 The use of volunteers in monitoring programmes – ‘citizen science’

Worldbirds http://www.worldbirds.org/

- In the UK http://www.bto.org/birdweb
- In Australia: http://www.birdsinbackyards.net/
- In the USA: http://www.birds.cornell.edu/LabPrograms/CitSci/

6.6 **Indicators**

As an example of policy-orientated reporting from CBM, information on all the main environmental indicators for the UK, including the wild bird indicators, can be found at [http://www.defra.gov.uk/environment/statistics/wildlife/index.htm](http://www.defra.gov.uk/environment/statistics/wildlife/index.htm)

The latest European Wild Bird indicators can be found on the EBCC website [http://www.ebcc.info/](http://www.ebcc.info/)

Information on BirdLife International’s suite of indicators can be found at [www.birdlife.org/action/science/indicators/index.html](http://www.birdlife.org/action/science/indicators/index.html)

6.7 **Monitoring reports**

Reports on monitoring results, often containing the results of bird population monitoring, are now produced by a number of countries. For examples, try:


*The state of the birds USA* [http://www.audubon.org/bird/stateofthebirds](http://www.audubon.org/bird/stateofthebirds)

Annex 1: Advantages, disadvantages and applicability of the different bird survey techniques that can be used for Bird Population Monitoring

<table>
<thead>
<tr>
<th>Survey technique</th>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Applicability for CBM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listing</td>
<td>Surveyors compile lists of birds in a particular geographic area, and the frequency of occurrence of birds on the list (&quot;reporting rate&quot;) is a crude measure of abundance.</td>
<td>Simple, therefore can involve amateurs and professionals. Collects data on rare species often not encountered by other monitoring regimes.</td>
<td>Observation and recording effort varies, thus data often not directly comparable (but see MacKinnon lists). Relative densities of vocal and highly detectable species overestimated.</td>
<td>Listing often detects population changes, but not the magnitude. However if many observers are involved and lists are time-limited (see TSC), then their usefulness for CBM is significantly improved.</td>
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<tr>
<td>Timed species counts (TSC)</td>
<td>These are in essence repeated species lists on which are indicated the first time each species was first recorded. Species then receive a cumulative score according to when they were first recorded on each count, and this index is used to infer relative abundance.</td>
<td>Need to record only the species seen (and not numbers), and so can focus on detecting new species. Quick, and so can allow for large areas to be covered.</td>
<td>Flocking species may be under- or over-estimated (compared to those that are widely dispersed across the study area), depending on the counting behavior of the surveyors.</td>
<td>If standardized, TSC is useful in comparing relative abundance of species across different sites at a particular time.</td>
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<tr>
<td>Territory mapping</td>
<td>The location and activity of individual birds is mapped over a series of visits, allowing the number of breeding territories within the study area to be calculated.</td>
<td>Useful for analysis of fine-scale bird-habitat associations. Can easily be combined with nest finding, telemetry, mist netting etc, thus enabling large amounts of data to be collected.</td>
<td>Requires high quality maps of the study area. Very time consuming, relative to the other methods. Inefficient for species that are non-territorial, semi-colonial or not monogamous.</td>
<td>Although this method can be used for Bird Population Monitoring, the method is very detailed and hence time-consuming for a participatory scheme.</td>
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<tr>
<td>Line transects</td>
<td>These are undertaken by observers moving along a predetermined fixed route and recording birds seen or heard on either side of the route.</td>
<td>In accessible habitats, covers the ground quickly and efficiently, recording many birds. Can be used on land, from the air or at sea.</td>
<td>Works best in open and uniform habitats. Takes no account of differences in detectability of species between different habitat types.</td>
<td>This is a highly adaptable technique and can survey individual species or groups of species, can be used to derive absolute and relative measures of bird abundance, and/or used for basic analysis if bird-habitat relationships. Its efficiency (in terms of quantity of data collected per unit effort) makes it one of the more efficient.</td>
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<tr>
<td>Method</td>
<td>Details</td>
<td>Benefits</td>
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<tr>
<td><strong>Point counts</strong></td>
<td>Counts are undertaken from a fixed location for a fixed time. They are very practical option in dense or inaccessible areas. It's often easier to gain access to a single individual point (count station) than to traverse a landscape (counting birds at the same time).</td>
<td>More observations are by song. Some birds may be attracted to the presence of observers, biasing results. Also highly adaptable technique and can survey individual species or groups of species, can be used to derive absolute and relative measures of bird abundance, and/or used for basic analysis if bird-habitat relationships. Additionally because count stations are relatively easy to allocate randomly, it enable for monitoring common birds at various locations within a landscape.</td>
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<tr>
<td><strong>Capture-mark-recapture</strong></td>
<td>Birds are caught and individually marked (e.g. with rings), and then the population size is estimated from the ratio of marked to unmarked birds subsequently recaptured or resighted. Ideal for skulking species or in those hard-to-reach habitats e.g. forest canopies.</td>
<td>Often very difficult to catch and mark a large enough sample size from which to draw statistically sound inferences. The costs of rings, wing tags, radio transmitters etc., and shortage of experienced and qualified handlers/ringers preclude wide application of this technique for Bird Population Monitoring.</td>
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<td><strong>Catch per unit effort</strong></td>
<td>By placing standard lengths and types of mist nests in standard locations, for standard time periods under similar conditions, this method can be used to monitor changes in population level. Information on population demographics (e.g. productivity, survival etc.) in addition to population change can be collected.</td>
<td>Time consuming. Requires personnel with the requisite skills, accreditation and equipment to catch, handle and mark birds safely. This requires experienced personnel, specialist equipment and thus its ability to engage a wide constituency within the general public (crucial for successful Bird Population Monitoring) is minimal.</td>
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<td><strong>Indirect counts</strong></td>
<td>The most common are counts of droppings (especially for gamebirds and waterfowl) and footprints, to ascertain presence, and in some cases abundance. Can detect presence of elusive, and especially nocturnal species. Distinguishing droppings and/or footprints may be very difficult. If there is a lag since the bird’s presence, weather will lead to degeneration of evidence.</td>
<td>Not ideal for group/membership activities, time consuming and susceptible to high levels of error, therefore not suitable for Bird Population Monitoring.</td>
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<td><strong>Response to playback</strong></td>
<td>Recordings of the song and call of species are played to solicit a response. Skulking, secretive and nocturnal species that would otherwise be. Playbacks need to be played for set durations, at a standard volume.</td>
<td>As a population monitoring tool, one would need to know when and</td>
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from the species, often skulking and hard-to-see species overlooked can be located and population indices or population estimates produced and under set conditions (time of day, weather etc), otherwise responses will vary where a bird responds to playback, to calibrate results. However, because this would have to be known for a group of species, the preparatory work required, equipment, difficulty with standardization etc preclude this as an efficient tool for Bird Population Monitoring

| Vocal individuality | The call of an individual bird is recorded and the specific individual identified (by ear or sonogram). | Non-intrusive therefore leads to minimal disturbance on the birds | Requires high quality recording of the birds to be able to identify to individual level | This by definition is for rare species, and so is not appropriate for monitoring common species, where it will be very difficult to identify individuals from groups encountered from their calls |

References: Gibbons and Gregory (2005); Gregory et al. (2004); Bibby et al. (2000), see also Chapter 6