

## BIRD POPULATION MONITORING IN BOTSWANA

### Involving citizens in biodiversity monitoring through use of a Wild Bird Index

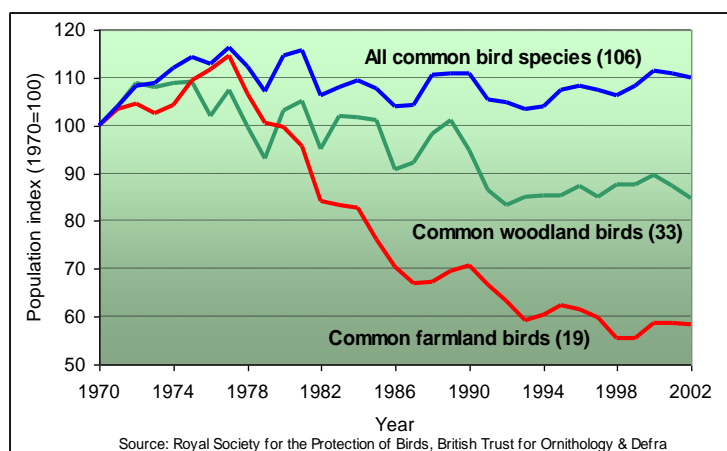
#### Introduction

Much of BirdLife's work is focused on monitoring globally threatened birds – however it would be a mistake to concentrate all funds and energy on these birds alone and ignore others which are currently common but which could join the Red Data List at a later date. The Bird Population Monitoring project in Botswana aims to develop a Wild Bird Index (WBI) which measures population trends of a representative suite of wild birds to act as a barometer of the general health of the environment.



Little Bee-eaters are widespread, abundant and easy to identify and are thus one of the ideal species for inclusion in the WBI

The methodology for producing the WBI is well developed and has been used successfully throughout Europe. Birds are good bio-indicators, and the trends obtained are clear, easy to interpret and, most importantly, quantitative (*i.e.* based on real factual data). They can therefore be used to report on the status of Botswana's biodiversity to the Convention on Biological Diversity.



Simple, clear graph showing wild bird trends in Europe

## Scientific basis for the project

The technical aspects of establishing a Bird Population Monitoring project are described in Senyatso *et al.*, 2008 - “Guidelines for the development of Bird Population Monitoring in Africa” and these have been followed in developing this project.

What is required is a scientifically-sound, low-tech monitoring methodology for detecting population changes of a wide range of birds – that is compatible and comparable with other similar initiatives throughout Africa and elsewhere in the world.

### Sampling methodology

There are three potential sampling methodologies, each with its advantages and disadvantages:

- Timed Species Counts – are repeated species lists in which birds are listed in the order in which they are seen at the sampling site. They are based on the simplistic assumption that, when birdwatching, on average common birds are noted first, whereas rare birds take longer to locate. The average time to first observation is thus a crude measure of abundance (Gibbons and Gregory, 2006).

Timed Species Counts collect a measure that is only indirectly related to abundance, but are useful in areas with high bird diversity where it is difficult for observers to detect, identify and count all the species present (not the case throughout most of Botswana).

- Line Transects – are based on recording birds along a predefined route within a predefined survey unit. There are variations on this theme whereby birds are recorded to an exact distance (variable distance) or within bands (fixed width) from the transect line – these give absolute densities of birds, but this detail is not necessary for bird monitoring where the objective is to determine trends.
- Point Counts – are counts undertaken from a fixed location for a fixed time. Point counts can be used to provide estimates of the relative abundance of each species or, if coupled with distance estimation, can yield absolute densities too (Gibbons and Gregory, *op. cit.*).

Relocating points can be difficult in a project involving ‘citizen scientists’ not all of whom will have access to a GPS. Point counts in Botswana require a long fixed time due to the low densities of birds, and this can result in double counting of the same birds (Hancock and Nkape, 2002). Finally, each point count only samples a very small area, making large numbers of points necessary for the sample to be representative. Point counts are the preferred methodology for Bird Population Monitoring in Botswana.

### Distribution of transects

A key feature of Bird Population Monitoring is the number and distribution of transects. For the data to be scientifically sound and usable, the transects must be distributed in a stratified random manner. If all the transects were located where most birdwatchers are found (Gaborone and Maun), for example, this would be very biased and would not be

representative of the country as a whole. In distributing the transects, the following system has been followed:

- Transects have been stratified according to the major regions (biomes) in Botswana, based on a vegetation map derived from existing published works *e.g.* Weare and Yalala (1971), Bekker and De Wit (1991) – see map on page 5.

The following biomes are recognized, in the proportions indicated in the table below. The third column shows the number of sampling units that need to be established in each biome for the Bird Population Monitoring system to be representative.

<b>Biome</b>	<b>Percentage</b>	<b>No. of sampling units</b>
Chobe	2.5	3
North-eastern Kalahari	8.6	9
Okavango Delta	3.8	4
North-western Kalahari	7.7	8
Ghanzi	2	2
Northern Kalahari	10.6	11
Makgadikgadi	5.6	5
Hard Veld	14.7	17
Eastern Kalahari	8	8
Central Kalahari	14	14
Southern Kalahari	17	19
South-western Kalahari	5.4	5
<b>TOTALS</b>	<b>99.9</b>	<b>105</b>

- The sampling units need to be stratified as indicated above to ensure adequate coverage of the whole country, but within this broad distribution, the exact locations should be chosen randomly. There are just over 800 quarter-degree squares covering the whole country, and in order to sample 10% of the area, every eighth QDS was chosen as the location for each sampling unit. This distribution is shown in the map on page 6 where the selected quarter degree squares are shown in black.
- It is also desirable to have some of the sampling units inside protected areas and others outside, since it is highly likely that there could be significant differences in bird numbers and trends between the different land use types (cf. Herremans and Herremans-Tonnoeyr, 2000). Map 3 on page 7 shows the distribution of transect sites relative to land use types; the randomly stratified sample covers the land use types adequately, as indicated in the table below:

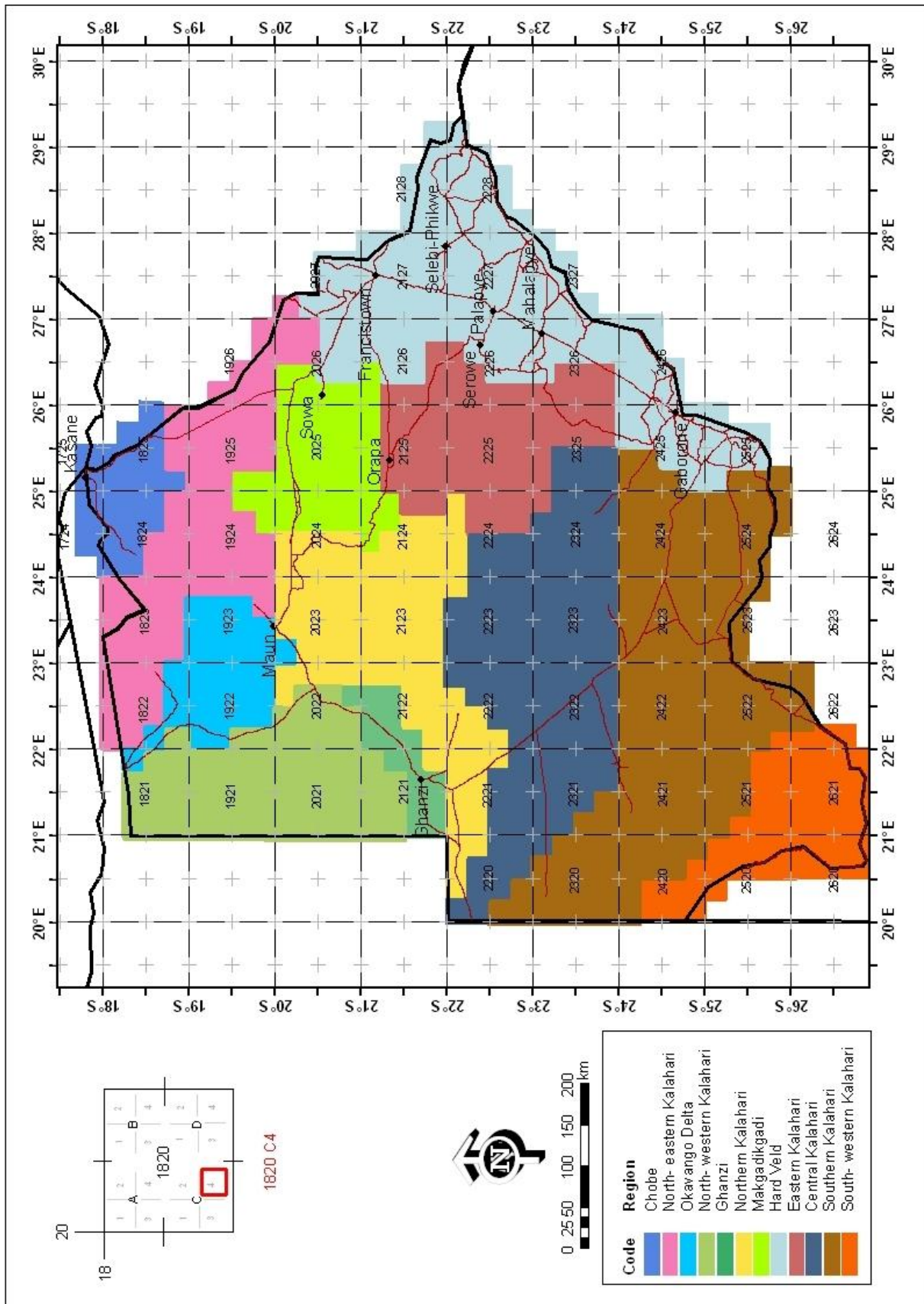
<b>Land-use type</b>	<b>No. of transects</b>
National Park	11
Wildlife Management Area	33
Game Reserve	9
Communal grazing	52

Note that minor adjustments have been made to the location of some sampling units to ensure that they do not straddle boundaries between land use types. A few potential sites have been moved slightly to ensure better coverage of Important Bird Areas.

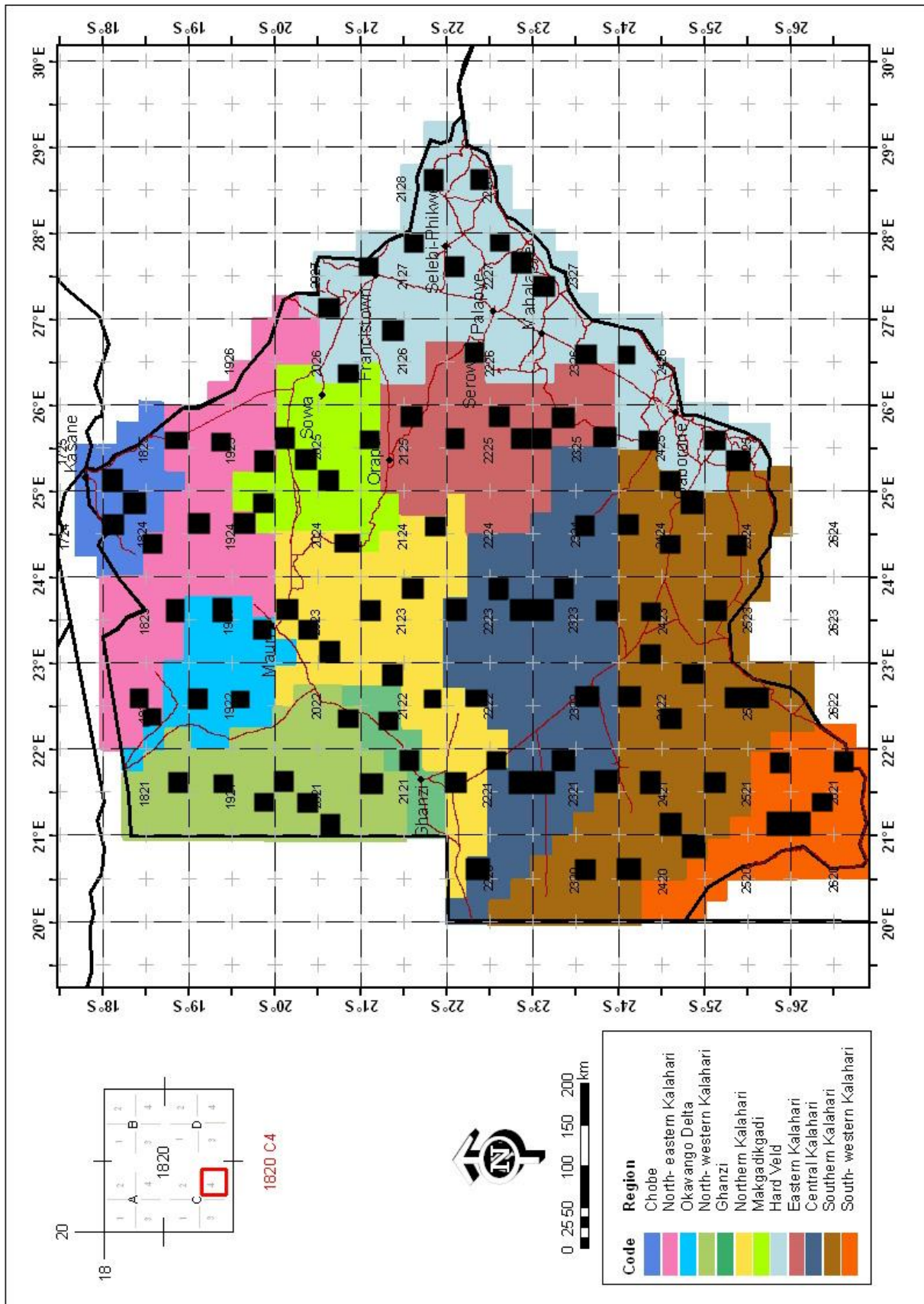
The 105 quarter degree squares where the transects will be located are listed in Appendix 2.

- Finally, within each quarter degree square (approximately 50 km x 50 km), the precise transect will be located, sampling part of the quarter degree square. Each transect will need to be precisely documented as to its start and end points, and the route followed so that if there are any changes in observers over time, the transect details are well-known. A central database of transects will have to be maintained by BirdLife Botswana, and the best way of doing this would be to keep GPS tracks of each. Since many participants will not have access to GPSs, it will have to be the responsibility of BirdLife Botswana to record these.

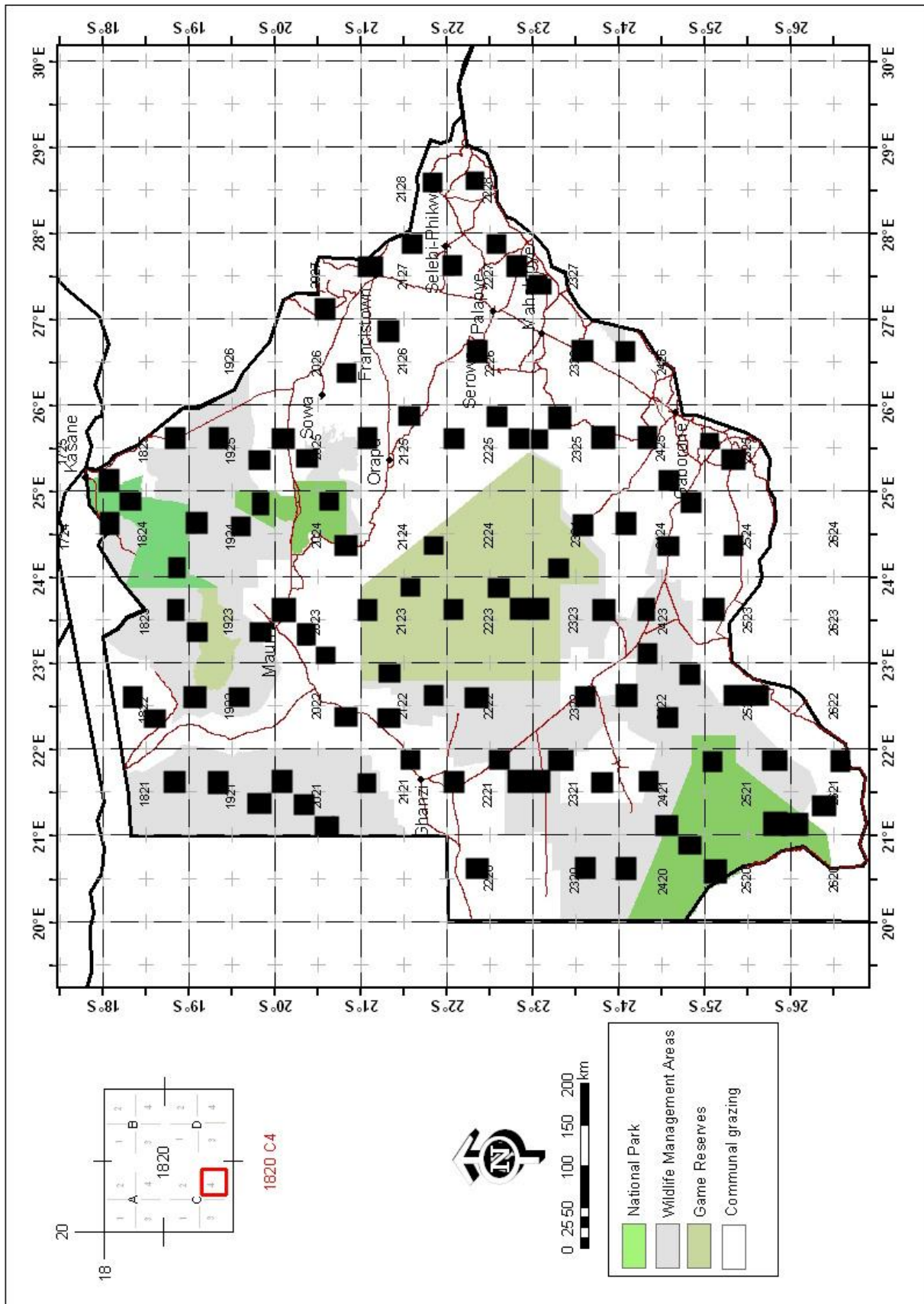
Map 1 showing biome types of Botswana



Map 2 showing distribution of quarter degree squares selected as the locations for transects



Map 3. Distribution of transect sites, by quarter degree square, relative to land use types.



**Project implementation**

In order to operationalise Bird Population Monitoring in Botswana, participants need to be identified and recruited. Good training is an essential part of any successful Bird Population Monitoring scheme, and will need to be done face-to-face (one-on-one or at training workshops) and through the dissemination of supporting materials. Essential supporting materials will include a user-friendly survey protocol and brochures motivating additional people to participate in the system.

A database of participants will also need to be established, listing names and contact details with the specific transects in the designated quarter degree squares. This database could be linked to an electronic mailing list for ease of communication.

It will be relatively easy to mobilize BirdLife Botswana members to initiate Bird Population Monitoring in Botswana; however, the network of members is spatially biased towards Gaborone and Maun, so considerable work will be required to identify, motivate and train participants in rural areas in order to get the required coverage. Once new participants have been recruited to the scheme, their interest will have to be maintained by frequent feedback – to this end, the framework for a Communication Plan has been developed (see Appendix 3).

### **Data collection and analysis**

Standardised survey forms have been developed to facilitate data capture in the field and later. It is essential that data are collected in a standardized way that facilitates computerization and subsequent analysis. A decision has been made to use the software package TRIM (TRends and Indices for Monitoring data) for analysis of the count data, and it is important that data are collected in a format suitable. Initially, all birds seen on the transects will be counted, except waterbirds since they are adequately monitored by the biannual African Waterbird Census – later on, analysis will show which species and groups of species are best for long-term use. Note that the counts have been specifically scheduled for early and late summer to include migrants – a group of birds that may decline due to threats encountered at any point along their flyways.

### **Conclusion**

This document aims to outline the methodology and details of a Bird Population Monitoring scheme in Botswana before it is implemented. It is essential that the system is well thought through at the outset so that it is not subsequently changed – with a long-term monitoring scheme, there should be no flaws detected in the system later on otherwise all the data collected over the years will be nullified. Fortunately, experience exists within the BirdLife partnership to ensure that a robust monitoring system is developed, and the methodology described here should meet all the essential criteria. What remains now is for it to be implemented in an equally rigorous way by as many participants as possible.

### **References**

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Herremans, M and Herremans-Tonnoeyr, D. 2000. Land use and the conservation of raptors in Botswana. *Biological Conservation* 94: 31 – 41.

Senyatso, K, Stevens, D, Eaton, M and Butchart, S. 2008. Guidelines for the development of Bird Population Monitoring in Africa. BirdLife International/RSPB, 37pp.

Taylor, N. 2008. What at the very least is living here? Establishing the minimum numbers of birds present during 48-Hour periods in the Central Kalahari during the Cold-Dry Season of May-June. *Babbler* 51: 13-33.

Weare, PR and Yalala, A. 1971. Provisional Vegetation Map of Botswana. *Botswana Notes and Records* 3: 131-148.

## **APPENDIX 1**

## GUIDELINES FOR PARTICIPANTS IN THE BIRD POPULATION MONITORING PROJECT

Bird Population Monitoring can be done by anyone with the inclination and a basic knowledge of birds in Botswana – in fact the system is designed to accommodate ‘citizen scientists’ and the more participants there are, the more robust it becomes.

The contribution of each individual participant is relatively small, and not at all onerous, but when pooled with data collected by a large number of other people, it becomes statistically sound and very valuable. **A key feature of the Bird Population Monitoring project is that it is a small effort which needs to be sustained over a long period.** Monitoring is a long-term activity, so it is essential for participants to make a long-term commitment.

If you would like to participate, this is all you have to do:

- Identify a 2km transect – a route that you can easily follow to count birds now and in the future, so your transect should follow a track, preferably an indistinct one that does not create any micro-habitats that will influence bird distribution or numbers.
- Permanently mark your start and end point to make it fixed so that you are able to find and repeat your transect next time you do your count again
- You may choose to drive or walk your chosen road/path stopping every 200m to count birds that you see/hear for five minutes.
- Then move to the next 200m and count for five minutes - you will collect a total of eleven points.
- Please do not record birds that you see/hear while you are walking between your 200m points.
- The recommended time for starting the count is 7:30 am or early in the morning when birds are very active. It is recommended that you do this in a group of not more than 3 and there should be only one observer. Make sure that your transect is repeatable. You do not need to be an expert birder to take part, you will improve as you participate.
- Once you have carefully selected your transect, try to document it as precisely as possible. This may be one of the more difficult aspects of participating in the project; however, if you have a GPS it is very easy – save your track and e-mail it to [blb@birdlifebotswana.org.bw](mailto:blb@birdlifebotswana.org.bw) or [education@birdlifebotswana.org.bw](mailto:education@birdlifebotswana.org.bw). If you don't have a GPS, you can trace your exact route on the satellite image in Google Earth (available through Botswana Tickbird if you are a registered user, or free off the internet). If you have any difficulty with documenting your route, please contact your nearest BirdLife Botswana office for assistance – it is vital that we have all the transects well recorded to ensure continuity and standardization.
- Assemble your team of observers – you will need a standard ‘team’ of observers who will be counting and recording the birds. The ‘team’ could be as few as one person (yourself), but it is probably better if it consists of two or three people, some of whom will spot and count birds while one records the data. Small teams are more likely to persist in the long-term, but there is a trade-off in terms of practicality. What is most important though is that the same team must always do the counts – obviously if the number of counters varies, the number of birds counted will not be comparable with previous counts. Similarly if your

team is joined later by a top birder with say, a better knowledge of bird calls, this will introduce a bias that will make comparison of the results difficult. It may not be possible to eliminate all variables, but they should be minimized as far as possible.

- Schedule your counts – for any day during November and February. If you are able to do them on the same dates every year, this would be first prize. The counts must also be done at the same time of day, preferably starting early in the morning. Again, this is because we are trying to establish standardized, repeatable counts – morning counts will definitely give different results from afternoon counts, but as long as they are always done at the same time, this does not matter.
- Conduct the count –Only use binoculars to aid bird identification, not to spot more birds further away. The aim of the transect is not to see the maximum number of birds, but to pick up changes in abundance by conducting them in a standardized way to enable valid comparisons to be made. Try to be as thorough as possible, but don't worry that you may miss the occasional bird – in theory, if the transect is done in the same way every time, the same proportion of birds will be missed. Especially, don't be concerned if you miss the odd Willow Warbler or Black-chested Prinia – in time, a suite of birds will emerge that are best monitored by these transects, and small or cryptic species are unlikely to feature. Don't bother to count waterbirds – they are monitored by a different set of transects, the African Waterbird Counts. Enter your data in the Common Bird Monitoring form overleaf.
- After the count, send your information to BirdLife Botswana, P O Box 26691, Game City, Gaborone or e-mail it to [blb@birdlifebotswana.org.bw](mailto:blb@birdlifebotswana.org.bw). It is best to do this soon after you have completed the count so that if there are any queries, the count is still fresh in your mind.



Remember to enjoy the counts – they are meant to be fun, and they have the added attraction of being worthwhile!

## APPENDIX 1

**List of quarter degree squares in which Bird Population Monitoring transects are to be located**

1824B1	2125B1	2320D1
1825A1	2127B1	2322D1
1822B3	2122A4	2324D1
1824B4	2122B4	2326D1

1822C2	2126B4	2321D3
1821D3	2121D2	2323D3
1823D3	2123D2	2325D3 I White (2325D2)
1824C2	2125D2	2420B1
1825D3	2127D2	2422B1
1922B1	2122D3	2424B1
1923B3 Randall, vanderPost	2124D3	2426B1
1924B1	2128D3	2421B3
1921B3	2221B1	2423A3
1925B3	2223B1	2423B3
1922D1	2225B1	2425B3
1924D1	2227B1	2421C1
1921C4	2220B3	2422C2
1923C4	2222B3	2424C2 H Hester
1924D4 P Hancock	2226B3	2425C1 M Goldsworthy
1925C4	2228B3	2420D4
2021B1	2221D2	2422D4
2023B1	2223D2	2424D4 K Ditshane??
2025B1	2225D2	2521B1
2021A4	2227D2	2523B1
2023A4	2221D3	2525B1 V Kootsositse <i>et al.</i>
2025A4 L Hughes	2223D3	2522B3
2021C1	2225D3	2524A4
2023C1	2227D3	2525A4
2024C1	2321B1	2522D1
2027C1	2323B1	2521C3
2022C4	2325B1	2521D4
2124A2 P Hancock	2327A2	2621A1
2026C4	2321B4	2621A4
2121B1	2323B4	2621D2
2123B1	2325B4	

## APPENDIX 2

### Communication plan for promoting the Bird Population Monitoring project

#### Objective

The purpose of this Communication Plan is primarily to maintain the interest of participants in the Bird Population Monitoring system by acknowledging their contribution, providing regular feedback on the data collected and disseminating useful information that will enhance their participation in the scheme. A secondary purpose of the plan is to keep external stakeholders informed of the results of Bird Population Monitoring in Botswana.

#### Target audiences

The following distinct groups of people are likely to participate in the scheme:

- BirdLife Botswana members
- Professional guides – especially from Ngamiland and Chobe
- DWNP staff, including trainees from BWTI
- Site Support Group members

There will also be external audiences with which regular contact should be maintained:

- BirdLife International/RSPB
- BirdLife Africa Partnership Secretariat
- Other BirdLife partners implementing a Bird Population Monitoring scheme elsewhere in Africa

### **Media available**

The following media already exist and can be utilized:

- Birds and People newsletter (quarterly)
- Familiar Chat (quarterly)
- BirdLife Botswana website
- Conservation News Botswana (quarterly)
- Motlose/Makgabisana naga (quarterly)
- Africa/Afrique

In addition to the above, it may be necessary to develop a biannual ‘news brief’ that is published in October and January preceding the counts, just to remind and motivate participants. A local BPM-net could also be established where participants could post their questions and findings for other participants to see and respond to.

### **Frequency of messages**

The flow of information to participants will have to be regular and frequent to maintain participant’s interest. A newsletter and/or news brief should appear every month; the BPM-net will be interactive and provide constant regular feedback and discussion.

### **Content creator/Sender of information**

The BPM national co-ordinator will initially be solely responsible for developing and distributing newsletters and material – both internally within Botswana and externally. However, early on in the process it will be necessary to decentralize the supervision of the Bird Population Monitoring project to BirdLife Botswana staff at each branch office. This will facilitate personal contact between BirdLife Botswana and the participants – branch BPM co-ordinators will also be able to develop material to be disseminated via the BPM national co-ordinator.