



## Terrestrial Migratory and Non-Migratory Bird Population Trends, Botswana



Willow Warbler, source- BirdLife Botswana Photo Library

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<sup>1</sup> The BPM Programme was established in 2010 and is part of the global effort to monitor terrestrial birds around the world (for more information see <http://www.bipindicators.net/wbi>). The Programme is aimed at demonstrating that birds are useful in showing changes in the overall condition of ecosystems or the environment and can be used by decision-makers to influence politicians to find suitable biodiversity management solutions. The BPM Programme mobilizes the participation of the citizen scientists in Botswana. The Programme has 190 transects monitored by 300 volunteers actively to date.

## Contents

Introduction .....	3
The ecological and conservation importance of species included in the report .....	4
Data collection method.....	4
Species selection .....	4
Statistical analysis .....	4
Graphs interpretation .....	5
Results.....	5
Red-backed Shrike and Lesser Grey Shrike seasonal comparison .....	5
Trends of the Yellow-billed Kite .....	6
Trend for Spotted Flycatcher .....	7
African Paradise Flycatchers trends.....	8
Trends of cuckoos .....	8
Trends for starlings .....	12
Trends of the Common Myna .....	14
Trends of Willow Warbler .....	15
Discussion .....	15
Challenges.....	15
Recommendations .....	16
Acknowledgement .....	16
References.....	17

## Introduction

The report is about some of the migratory birds that are very common in Botswana. According to BirdLife International (BLI) electronic newsletter (March 2018) migratory birds are facing worse environmental hazards compared to previous years. The BLI newsletter has entitled their article ‘It’s only going to get worse unless we work together’. The article describes that things are only going to be worse for migratory birds along the Atlantic Americas Flyway because the Trump administration recently issued a reinterpretation of the hugely important and influential Migratory Bird Treaty Act which would no longer make industries liable for incidental bird deaths caused by bad planning. In response to this the BirdLife International partnership has launched a campaign with 8 partners based along the flyway to tackle the crisis head on. Data used from the European bird monitoring schemes shows that more than 40% of the migratory species are declining, and nearly 200 are now classified as globally threatened (<http://www.birdlife.org/worldwide/policy/flyways-and-cms>).

Furthermore, it is very important to note that migratory birds have no borders and so they are faced with various challenges caused by development in countries they use as migrating routes. Two thousand species of birds, 20% of all known species, make regular seasonal movements. Many travel thousands of miles between their breeding and non-breeding places and they **are being hit hard when they are most vulnerable**. After very long journeys they face countless dangers. These may include the destruction and degradation of natural habitats, the loss of critical stopover sites such as coastal wetlands, illegal killing, poisoning, pollution, and collisions with badly-sited infrastructure such as power lines and wind turbines. The sectors that affect migratory birds the most have been identified as those of agriculture, energy, hunting, climate change, tourism and waste management.

Landscape impacts such as conversion of forests to plantations, drainage of wetlands, desertification of savannahs and land conversion to agriculture are having an impact globally. BirdLife International states that the potential disappearance of migratory species from flyways and the landscape, locally, nationally and regionally was unthinkable 30 years ago, but is now an increasing possibility unless action is taken on an international scale to conserve sites and habitats along their flyways as well as direct conservation actions for threatened species.

Simon Wotton et al (2017) states that the overall trends of Afro Palearctic migrants in Botswana and Uganda showed a significant moderate increase with three species in Botswana (the European Bee-eater, the Barn Swallow and the Spotted Flycatcher) showing a significant increase. It is against this background that this report is produced to show the population status of some of migratory birds that breed mostly in Botswana using Bird Population Monitoring data accumulated from 2010 to 2017.

The report also aims to help clear the world concern on the population status of Botswana’s migratory birds and to answer some of the local birders’ concerns as they have verbally reported that they are not spotting some bird species frequently compared to some five to ten years ago. The population trends shown in this report are of the Yellow-billed Kite, Cuckoos, Spotted Flycatcher, African Paradise Flycatcher, Willow Warbler and a few starlings of which some are not migrants but were included in order to compare their status with the expansion of the Common Myna’s distribution.

## The ecological and conservation importance of species included in the report

The major conservation concern is that migratory species if not closely monitored will be threatened with extinction; they are essential components of the ecosystems that support all life on earth by acting as pollinators and seed distributors so they contribute to ecosystem structure and function. Apart from being migrants and facing unprecedented challenges the majority of migratory birds are insect eaters. They play a vital role in controlling the population of insects, pests and rodents so their population increase and decline has an ecological impact to the environment. In local and global economies, migratory birds play an important role through subsistence, recreational and commercial hunting activities providing food and income. More recently they have become prime attractions for ecotourists such as birdwatchers. BirdLife Botswana annually rewards the first person to spot the Yellow-billed Kite on its arrival in Botswana from migration. In addition, migratory species have a great significance in many cultures – in legends, stories, religions, medicine and customs. They even play a major role in the way we measure time and experience seasons. Nowadays humans also benefit from them for recreational activities and educational purposes. The Common Myna is an alien species which threatens to invade cities, towns, villages and any human developed area including the protected areas. As it increases its range and distribution it negatively affects the population of the native species. It is also a possible threat to the starling species as it competes for nesting and sometimes chases them away and kills their young to use their nests.

## Data collection method

The method used to collect the bird data that produced trends was point transect technique and the data was collected by volunteers, to whom we are very thankful, mainly for the long term commitment they have shown, across Botswana. The transects each traverse 2km reasonably straight lines in their areas.

## Species selection

The species selection for migrants was based on those with sufficient data to produce trends and those for Common Myna and starlings was based on their ecological co-existence which is of conservation concern to the population of native birds. Migratory species which only occur in low numbers, or species which cannot be counted with sufficient representativeness, have been excluded from the analyses.

## Statistical analysis

The statistical method used to draw the graphs accounts for missing data and over and under sampling of locations. Species trends were produced using TRIM v. 2.53 which analyses time series of counts with missing observations using Poisson regression. The program TRIM is estimating bird numbers for missing counts (imputing) taking into account site. Counts were modelled as a function of site and year effects. A TRIM change-point model with a change-point in every year, correcting for autocorrelation and overdispersion was used. The multi-species Wild Bird Indices were produced using MSI-tool a script that runs in R 3.2.3 (R Development Core Team, 2017), which accounts for sampling error in the calculation of such indicators with bootstrapped confidence limits and tests for significance based on the Monte Carlo simulation.

For each indicator, 10,000 simulations were specified, the index was set to 100 and the standard error was set to zero in the first year. Standard trend classifications and significance levels from the outputs of TRIM and MSI-tool were used.

## Graphs interpretation

The graphs show a line plot of the annual indices for each species, between 2010 and 2017, with the baseline year (2010) index set at 100. The error bars shown are the 95% confidence limits (as calculated from the TRIM output), and the linear trend is shown as a dotted line.

## Results

### Red-backed Shrike and Lesser Grey Shrike seasonal comparison

Botswana is at the core of the non-breeding ranges of both species and a larger proportion of both species occur in Botswana compared to other areas in Southern Africa. The Red-backed Shrike is a regular host of Common Cuckoo in brood parasitism. According to Adamik (2009) there were several hundred pairs of Red-backed Shrike still breeding in Britain in 1945, but in the 1950s and 60s they both underwent precipitate declines, perhaps because of the advent of intensive farming and by 1989 the shrike had ceased to nest there and the occurrence of Cuckoo nestlings in Red-backed Shrike nests has significantly declined over the past 43 years. In Botswana the seasonal comparison of the Red-backed Shrike shows more records of the Red-backed Shrike than the Lesser Grey Shrike from 2011 to 2017 (Figure 1 & 2). The Red-backed Shrike is recorded in higher numbers during the February counts than those of November. Similarly, Lesser Grey Shrikes are recorded more in February counts than in November.

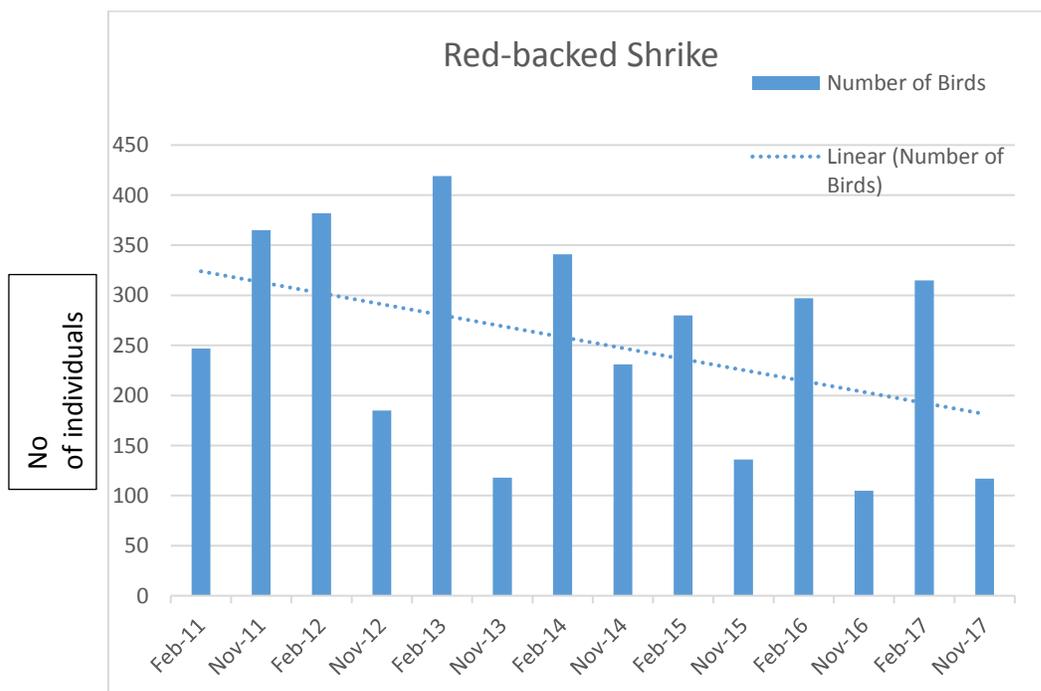


Figure 1: Seasonal comparison for the Red-backed Shrike

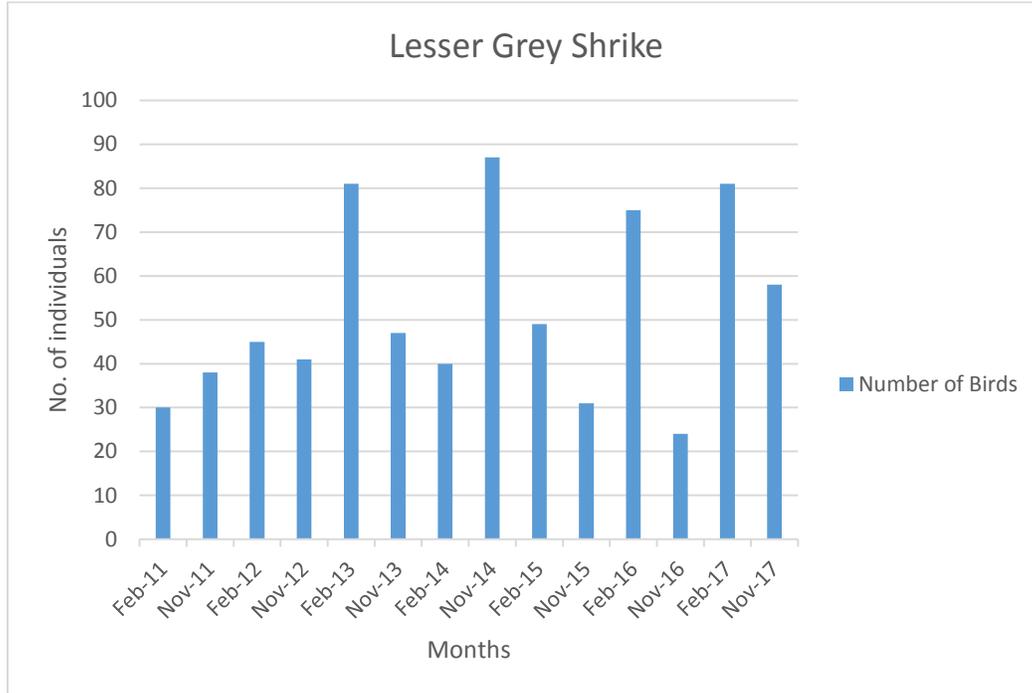


Figure 2: Seasonal comparison of the Lesser Grey Shrike

### Trends of the Yellow-billed Kite

Yellow-billed kites can be found almost anywhere, and is sometimes more common to see outside of protected areas than within because of a lack of competition from other species. It is, however, also quite common within protected areas. The only habitats avoided by this bird are dense forests, true deserts, and mountains at high altitudes. Urban areas suit this bird well, as it is incredibly opportunistic in its behavior. The majority of BPM transects are undertaken adjacent to developed areas where the species is expected to be seen frequently. The figure 3 below shows a moderate increase in the population of the bird from 2010 to 2017. There has to be more data collected for the next five years to see whether the population will continue to increase. The sightings of the bird are indicating differently as they show few records from the monitored transects.

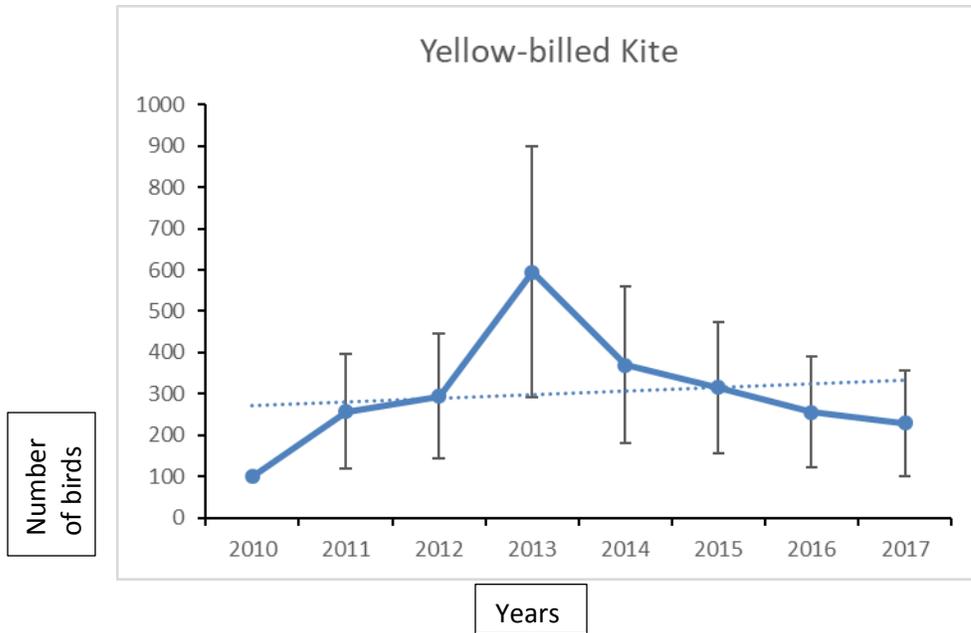


Figure 3: Yellow-billed Kite trends 2010 - 2017

### Trend for Spotted Flycatcher

The graph shows a moderate increase of the Spotted Flycatcher from 2010 to 2017 (Figure 4). This is contrary to the general trends in Europe where the species is seen to be declining. The population is declining in North and Central Europe owing to habitat conversion, cooler summers, and decreasing insect populations caused by pollution and insecticides. In Europe, trends between 1980 and 2013 show that populations have undergone a moderate decline (EBCC 2015).

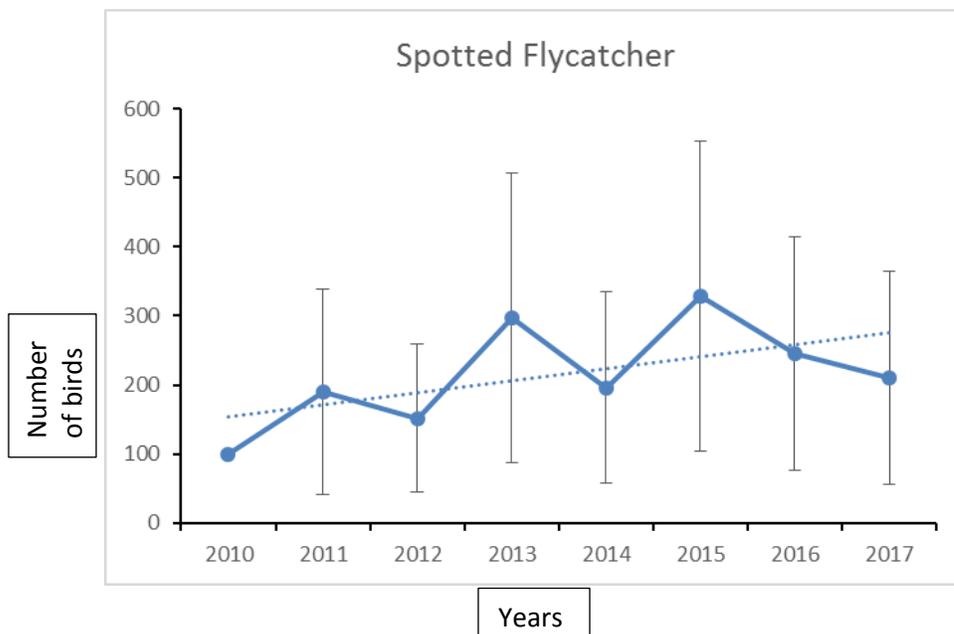


Figure 4: Spotted Flycatcher trends 2010 – 2017

### African Paradise Flycatchers trends

The African Paradise-Flycatchers are intra-Africa migrants which are found throughout most of Sub-Saharan Africa, excluding the south-western section. They are well adapted to a variety of habitats, and are regularly found in cultivated gardens in highly populated areas. According to BirdLife International data zone the African Paradise-Flycatcher is classified as Least Concern (<http://datazone.birdlife.org/species/factsheet/african-paradise-flycatcher-terpsiphone-viridis>). Data from the European bird monitoring programmes show that the population trend appears to be stable and the Botswana data shows an uncertain population trend (Figure 5).

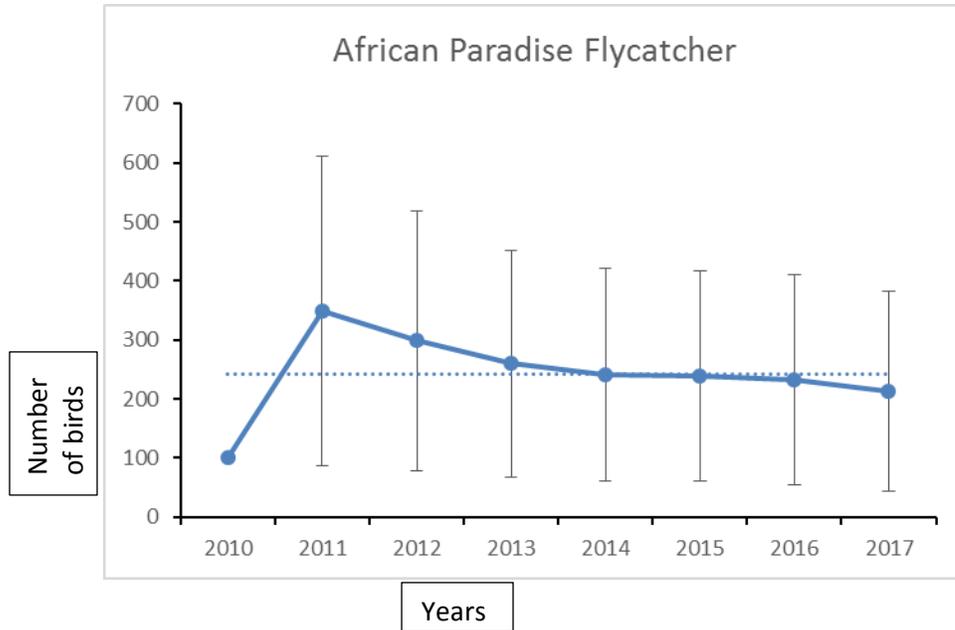


Figure 5: African Paradyse-Flycatcher trends 2010 – 2017

### Trends of cuckoos

Cuckoos are primarily migratory except the Thick-billed Cuckoo. Cuckoos are difficult to identify by sight because during the transect visits, sightings are based on their calling. So the question arise does everyone knows their calls, and when there is dry weather the cuckoos stop calling which might result to under sampling even when they are present. Results from the BPM data shows that most Cuckoos show an uncertain trend and these are the African Cuckoo, Jacobin Cuckoo, Diderick Cuckoo, Red-chested Cuckoo, Klaas' Cuckoo, Levallant's Cuckoo and there is a moderate increase for the Black Cuckoo only (Figure 6 to 12).

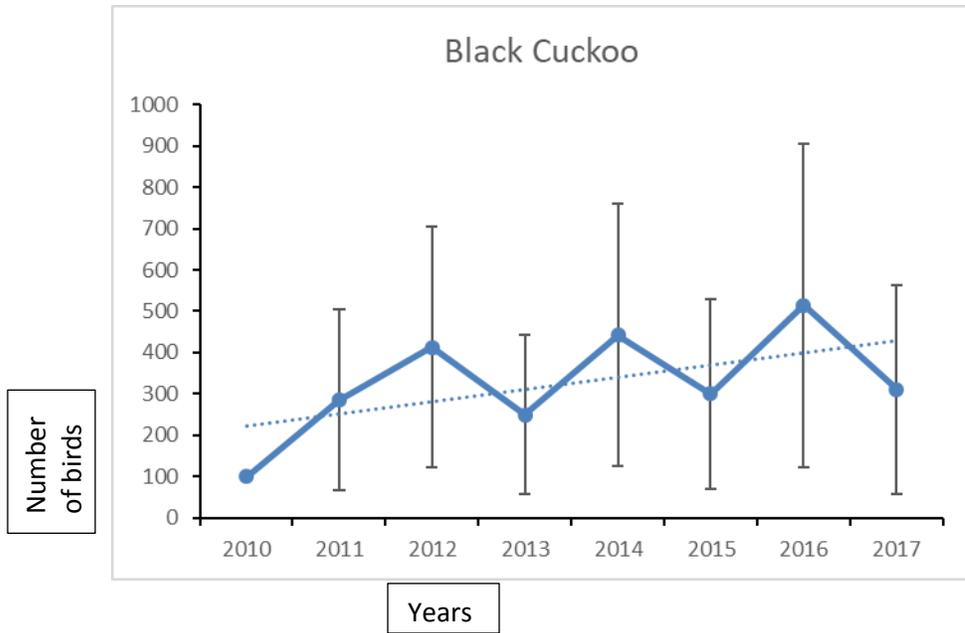


Figure 6: Black Cuckoo trends 2010 – 2017

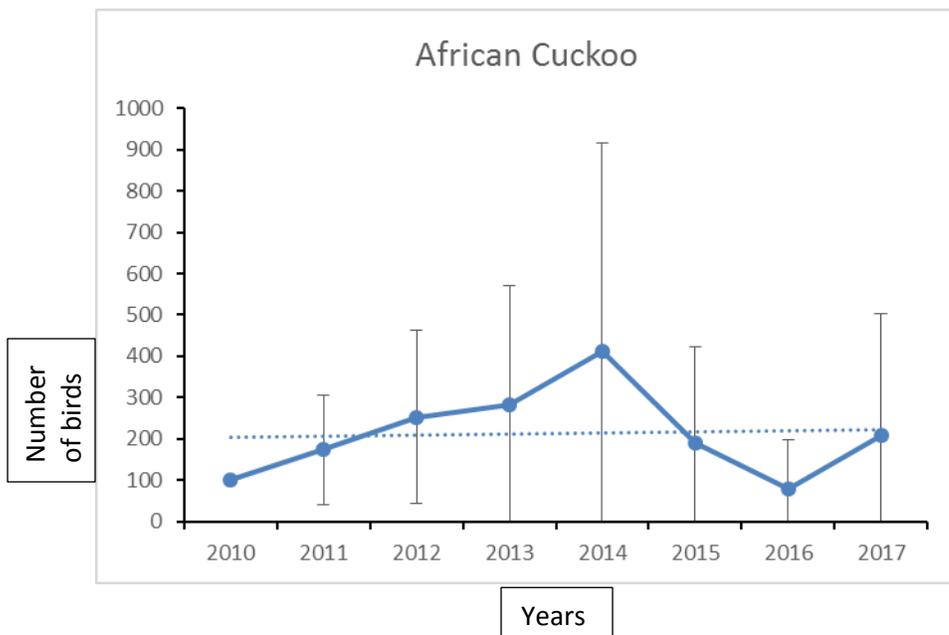


Figure 7: African Cuckoo trends 2010 – 2017

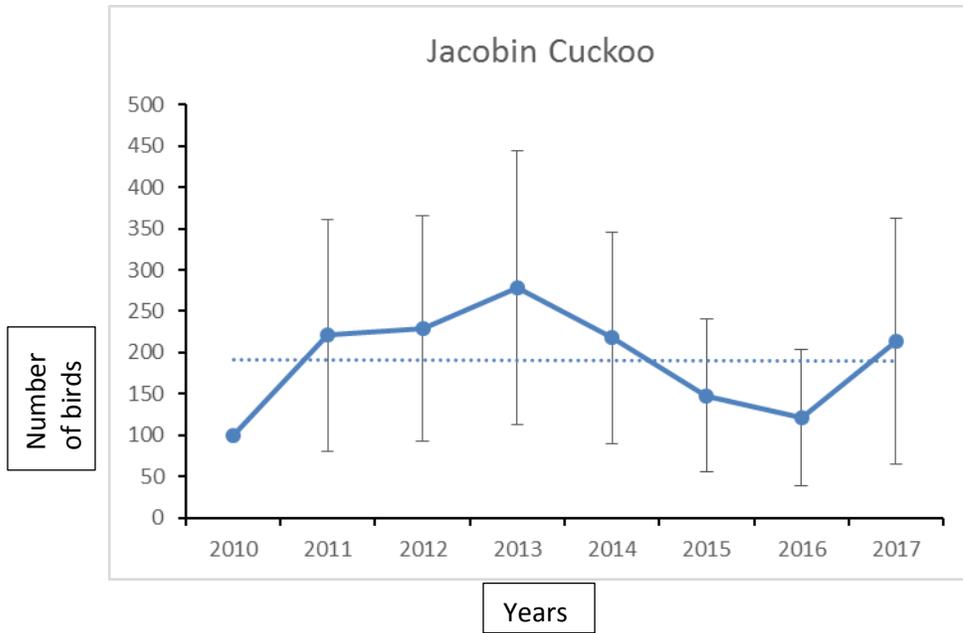


Figure 8: Jacobin Cuckoo trends 2010 – 2017

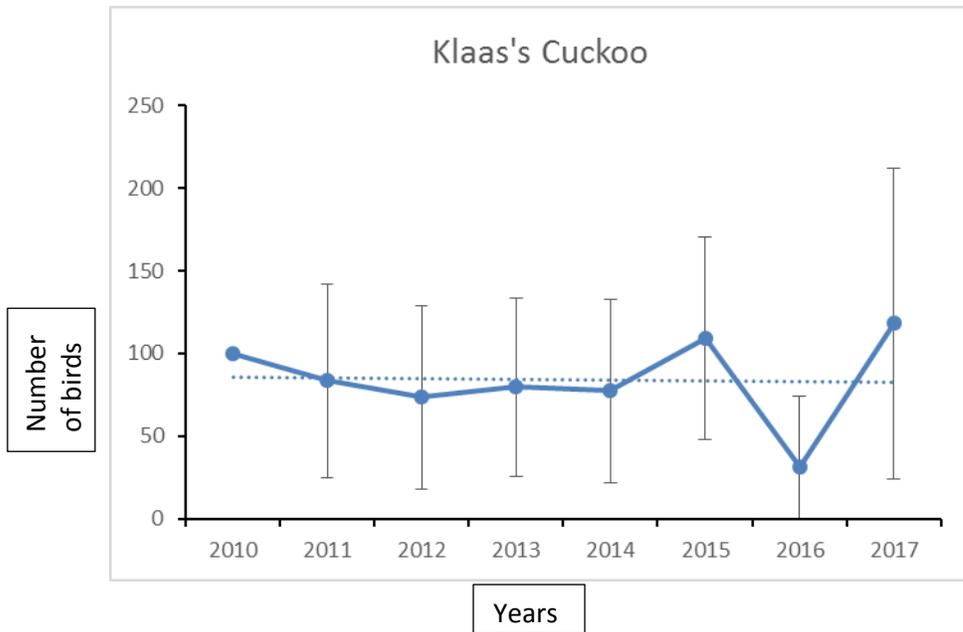


Figure 9: Klaas' Cuckoo trends 2010 – 2017

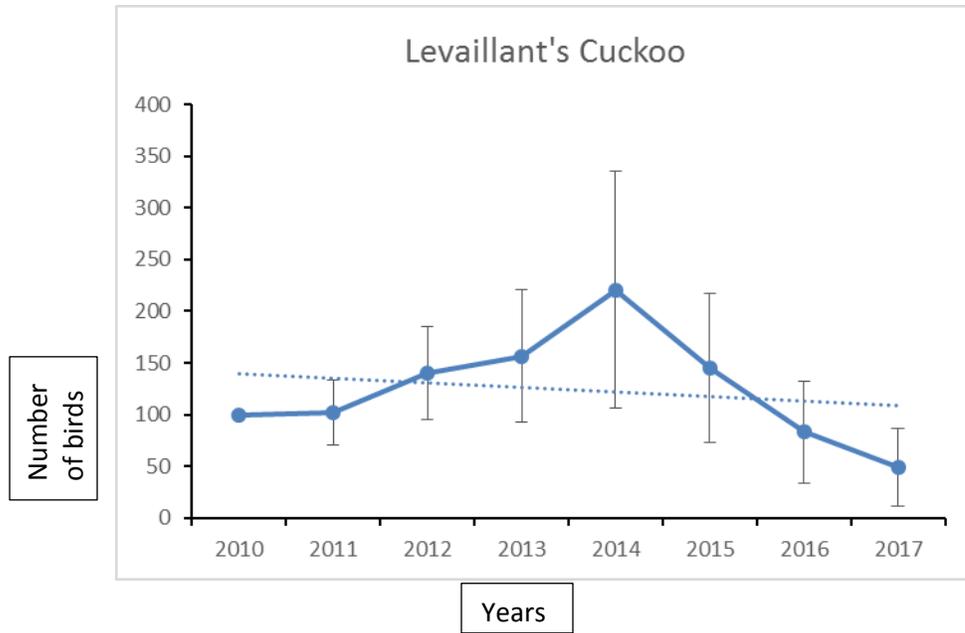


Figure 10: Levaillant's Cuckoo trends 2010 – 2017

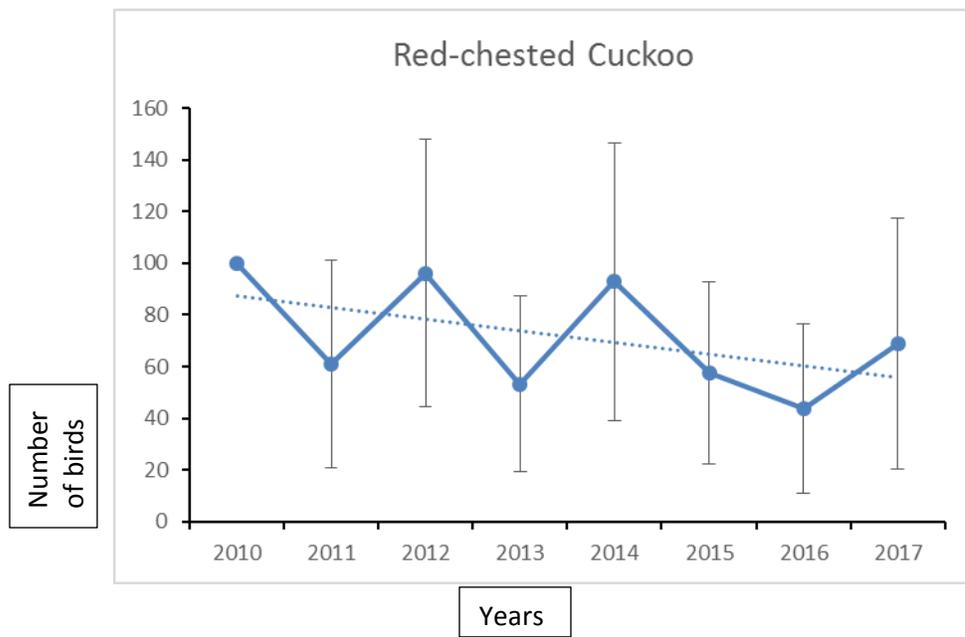


Figure 11: Red-chested Cuckoo trends 2010 – 2017

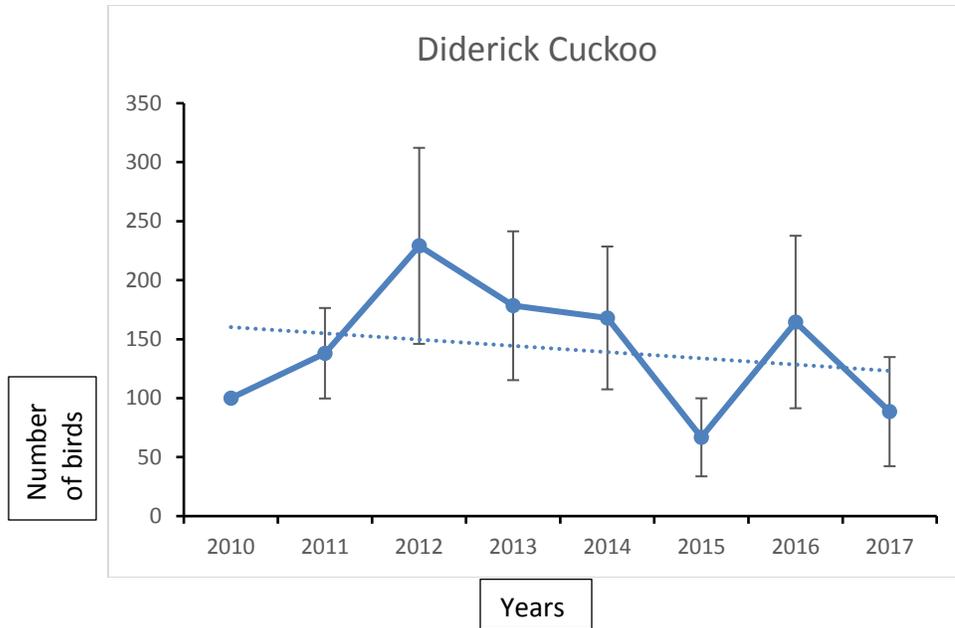


Figure 12: Diderick Cuckoo trends 2010 – 2017

### Trends for starlings

The Wattled Starling is nomadic, its number varies from year to year according to availability of rainfall. The species is a rainfall indicator. The current graph shows high records of the bird in Botswana during the period of high rainfall and when there was drought and heat wave in 2015 and 2016 it was recorded in low numbers. Because of the fluctuations of rainfall for the past three years there is a steep decline of the Wattled Starling shown by figure 13 below. The Violet-backed Starling has an uncertain population growth and the Cape Glossy and Burchell’s Starlings shows a stable population growth (Figure 13 to 16).

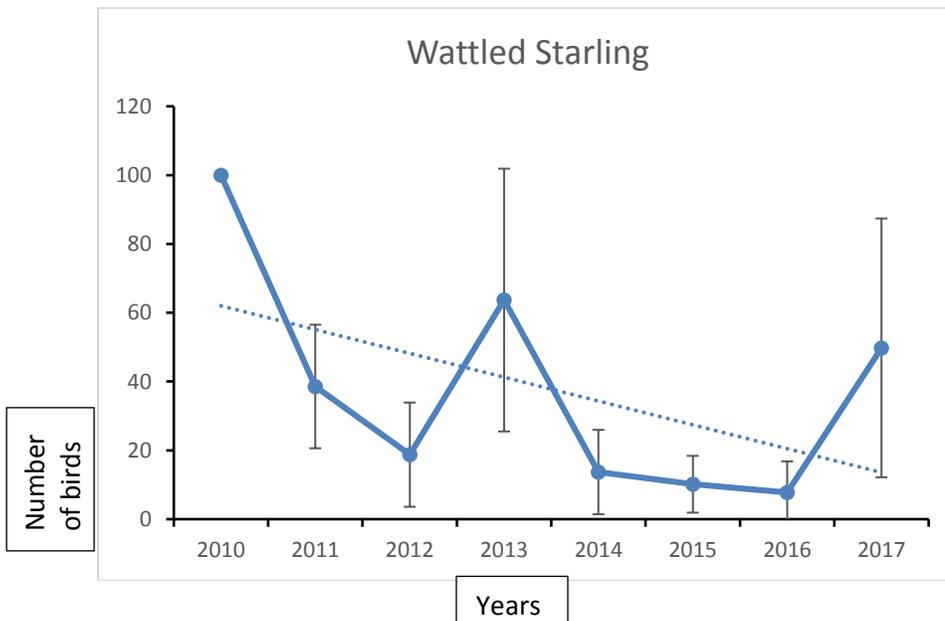


Figure 13: Wattled Starling trends 2010 – 2017

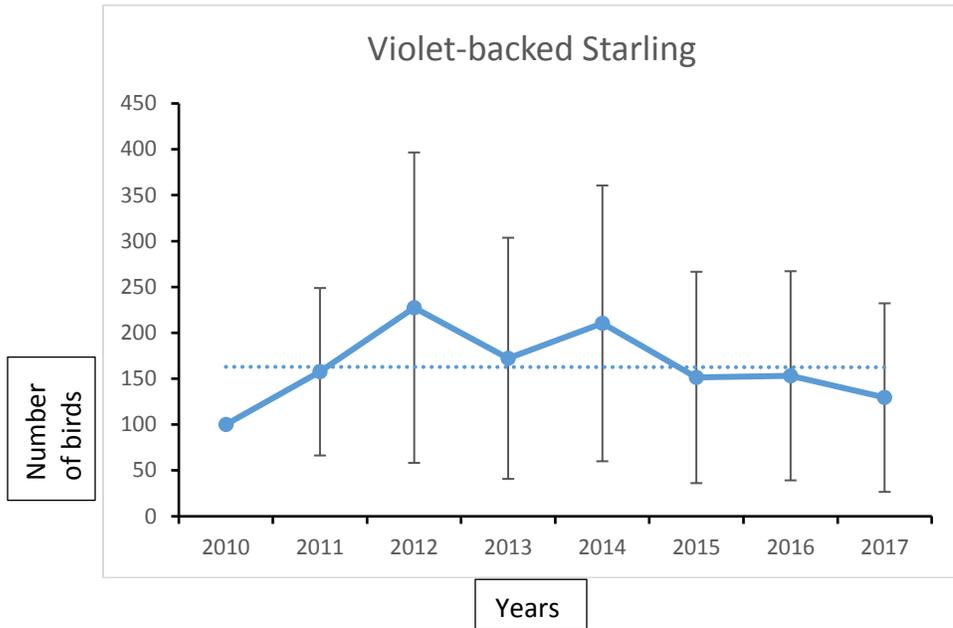


Figure 14: Violet-backed Starling trends 2010 – 2017

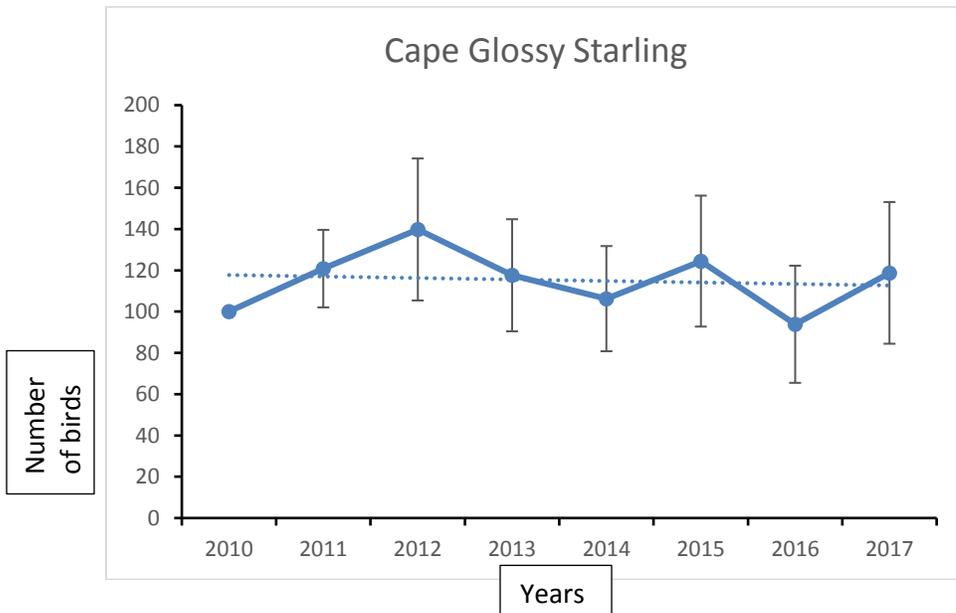


Figure 15: Cape Glossy Starling trends 2010 – 2017

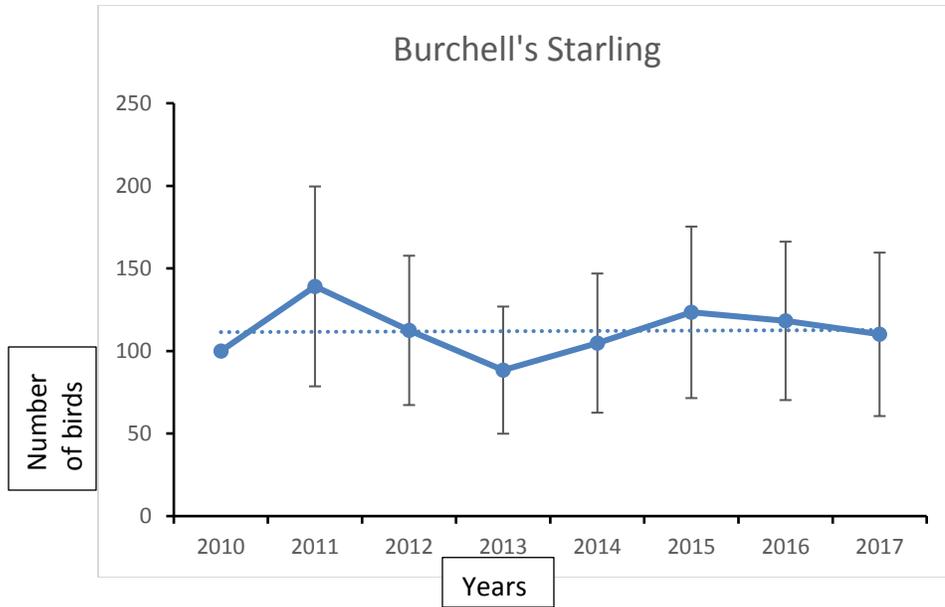


Figure 16: Burchell's Starling trends 2010 – 2017

### Trends of the Common Myna

The Common Myna targets indigenous birds for nest competition, especially starlings, thus it is key to keep a close monitoring on population trends. So, if there is a sign of decline, this may be detected early and be responded to quickly in order to identify the cause and apply necessary measures to stop the decline. The species shows an uncertain growth (Figure 17), although, according to verbal communication with counters, the species has extended to other areas in Botswana where it used not to be found, such as Central and Ngamiland.

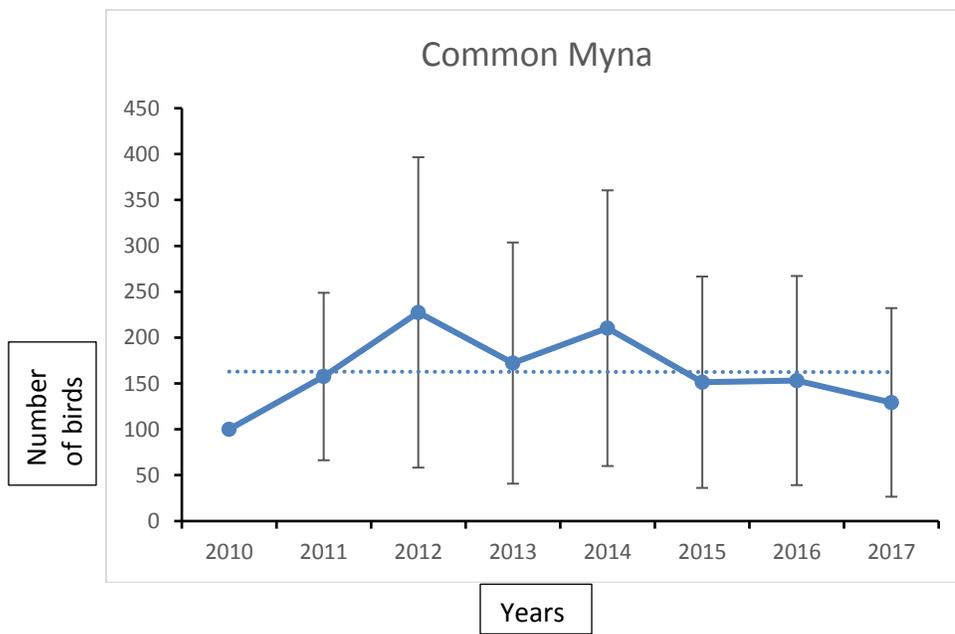


Figure 17: Common Myna trends 2010 – 2017

### Trends of Willow Warbler

According to the BTO (British Trust Ornithology) Science Newsletter, populations of many of the UK-breeding birds that migrate to Africa for the winter have fallen rapidly since 1990s to date. The declining trends are linked to conditions experienced during breeding, over winter, or on migration. There is a moderate decline in the population of the Willow Warbler in Botswana (Figure 18).

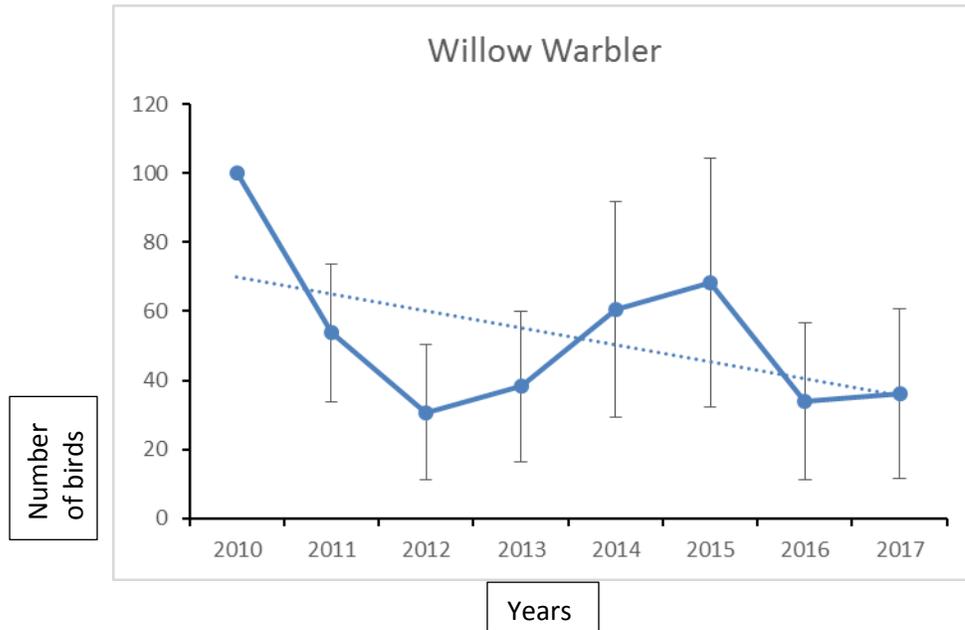


Figure 18: Willow Warbler trends 2010 – 2017

### Discussion

Most migrants seem to be stable, some have moderate increases where a few have a moderate decline and the one worth noting is the Willow Warbler. Volunteers need to take note of its presence during the transect visit because it prefers wooded and bushy areas so these birds are best distinguished by call. Only the Wattled Starling shows a steep decline in trend because of its behavior is nomadic. Although the European bird monitoring data shows a decline in the majority of migratory species, the Botswana population seems not to be of great concern. More records for the Red-backed Shrike could be a possibility that some volunteers are confusing it with the Lesser Grey Shrike. Although the Common Myna shows a stable population growth there are records of new locations from the data showing more expansion of the species in towns and cities countrywide.

### Challenges

Data inconsistency is a major factor. Despite a large dataset with much real count data available, missing counts make a big difference. A complete dataset involves counts for all counting units in all counting months of the year. Most volunteers have abandoned their transects and some are becoming weary of doing their visits. They are no longer as excited and motivated as before.

### Recommendations

Some migrants which have insufficient data to plot trends were raptors like harriers, osprey, eagles, falcons, and warblers, wagtails and pipits. It was also not possible to produce trends for Great Spotted Cuckoo, Common Cuckoo, Abdim's Stork, Grey-headed Kingfisher, African Pygmy Kingfisher, Lesser Kestrel, European Roller or European Golden Oriole – these species were not recorded in enough transects in any of the surveyed years (2010 to 2017) It is ideal to have trends of all migratory species as they are faced with many challenges across the globe. BirdLife Botswana requests volunteers to be on the lookout for these species. If you are not familiar with their identification please make it a point to study them, know their habitats, behavior/habits and calls so that during your next visit you will be able to identify them when they are around at your transects. Swallows and other common migrants will be surveyed in the next report. There has to be a study done to compare trends of migratory species in Europe and in Botswana to establish if there is any variance in the extent of decline. Migratory birds need close monitoring.

### Acknowledgement

A sincere gratitude is sent to all the BPM Programme data contributors, without whom we could not have been able to see trends of migrants after seven years. BirdLife Botswana trusts you will continue with this great effort until the Programme reaches at least twenty years of dataset accumulation. I wish to thank Mr Simon Wotton at the Royal Society for the Protection of Birds for his dedication in providing technical support to the bird monitoring programme in Botswana. BirdLife Botswana would like to thank the financial supporters, who are also the implementing partners, namely the Department of Wildlife and National Parks.



**Common Mynah- Record every sighting of the bird and share the news with BirdLife Botswana!**

## References

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<https://www.bto.org/science/latest-research/willow-warbler-breeding> trends linked to winter ecology