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## RANGE CHANGES AMONG BIRD SPECIES IN THE FAR NORTHERN CAPE

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## RANGE CHANGES: BIRDS

### RANGE CHANGES AMONG BIRD SPECIES IN THE FAR NORTHERN CAPE

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#### INTRODUCTION

Ornithologically, the Northern Cape is the most poorly known part of South Africa. This paper provides insights into how the ranges of bird species have changed in a study area in the far Northern Cape in the two-decade interval between the First and Second Bird Atlas Projects in Southern Africa (SABAP1 and SABAP2).

#### STUDY AREA

The study area is the region bounded by the Orange River and the N14 highway in the south, the international border between South Africa and Botswana in the north and longitudes 20°E and 23°E, but excluding the Kgalagadi Transfrontier Park.

The climate is harsh. Daytime temperatures in summer often exceed 40°C, and in winter night-time temperatures sometimes drop below –5°C. Rainfall is erratic and averages no more than 250 mm per annum.

The vegetation of the central part of this region consists of *Acacia haematoxylon* shrub savanna on rolling red dunes. In the north of the region, a tall *Acacia erioloba* savanna follows the dry river beds of the Kuruman and Molopo Rivers. The eastern fringe consists of a mixed species tree savanna (*A. erioloba* and *A. haematoxylon* are present among other species) which merges into the Bushveld habitat of the

North West and Limpopo provinces. The western fringe is stony, with sparse vegetation, including many succulents and the distinctive tree *Aloe dichotoma*. By contrast, the Orange River in the south is lined by dense reedbeds and riverine woodland with tall trees and dense undergrowth. The invasive alien tree *Prosopis* sp. is prominent there, as well as a diversity of indigenous species.

The valley of the Orange River is intensively cultivated, with vineyards and lucerne fields predominating. Away from the river, stock farming (including game ranching) and salt extraction from the dry pans are the only economic activities. Human modification of the stock farming region includes fencing (no part of the region has been left unfenced), the constant provision of water in water troughs, the establishment of well-watered gardens with tall trees at isolated homesteads, grazing pressure by livestock which generally exceeds that which would naturally occur, and the suppression of grass fires.

The visible effects of over-utilisation of pasture lands take the form of bush encroachment to only a limited extent, with thickets of *Acacia mellifera* in shrub form in places. More generally, there are areas which have been stripped bare of vegetation, with only pioneer species and the coarser grass species re-appearing after good rains.

This is the part of South Africa which is most remote from major human settlements. As a result of its remoteness, its harsh climate and sparse vegetation, it is the part that is least visited by birdwatchers and nature enthusiasts. Those that visit the popular Kgalagadi Transfrontier Park generally do not stop while passing through.

#### METHODS

By October 2013, the accumulated data for the second southern African bird atlas project (SABAP2) for the study area were too scanty for any analysis. From November 2013 for two years, I undertook data collection in the study area, following the SABAP2 protocol, improving

the coverage for the area to the extent that this analysis became possible.

The range change maps on the SABAP2 website <http://sabap2.adu.org.za> representing the differences in reporting rates per quarter degree square between the two southern African bird atlas projects (SABAP1 with data collected mainly between 1986 and 1992 and SABAP2 with data collected between 2007 and the present) were consulted.

I used a wireless internet connection to access the data in places where the signal was not strong. To avoid the build-up of frustration while waiting for the relevant pages to slowly download, or fail to download, I did breathing exercises and thought positive thoughts.

The interpretation of the maps is not straightforward. Differences in species reported ranges between the two surveys could result from the species having been overlooked in some localities where it occurred in either one of the surveys, especially because the volume of data collected for the study region in both surveys was small relative to the size of the region. For example, the range change map for the Barn Swallow *Hirundo rustica* shows that there appears to have been a sharp decline over parts of its South African range, but those correspond with the areas of least coverage during the current survey.

One must be wary of inferring trends when only two data points are available. The apparent increases and declines may be the result of frequent short-term fluctuations, especially for waterbirds and other nomadic species.

Where there is little difference in reporting rates and ranges for the two surveys, one cannot conclude that no change has occurred, but rather that the current data are insufficient to reveal the changes, if any. Apparent range changes in the rest of South Africa have been mentioned where relevant. Although the neighbouring countries are

included in the available range change maps, the relevant data for those countries are at present insufficient for analysis.

Despite the reservations, the range change maps based on current data reveal obvious and striking range changes within the study area for some species.

The results are presented in four sections. The first deals with range expansions along the Orange River, the second discusses range expansions and population increases in the region as a whole, the third discusses range contraction and population decreases, and there is a final section on other trends.

## RESULTS

### *Range expansions along the Orange River*

#### **Black-collared Barbet *Lybius torquatus***

The species was not recorded in the region during the previous survey (SABAP1). There have been four observations along the river banks during the current survey. It may be in the process of becoming established as a resident here. It appears to have undergone a general westward expansion elsewhere in South Africa.

#### **Crested Barbet *Trachyphonus vaillantii***

Not recorded in the region during the previous survey (SABAP1), but is now resident and common along the river banks and vicinity and also around homesteads away from the river in the east of the region. There appears to have been a southward expansion elsewhere in South Africa.

**White-fronted Bee-eater *Merops bullockoides***

Not recorded in the region during the previous survey but now resident and common along the river banks. Its invasion of the region may be linked to the establishment of mature gum trees (*Eucalyptus* sp.), which are particularly attractive to bees, along the river banks. It appears to have expanded southward elsewhere in South Africa.

**Little Bittern *Ixobrychus minutus***

Despite a general range contraction elsewhere, it has expanded westward along the Orange River.

**South African Cliff-swallow *Hirundo spilodera***

Not previously recorded from the region, but now a summer migrant with a colony numbering tens of birds breeding regularly underneath the main road bridge over the Orange River in Upington.

**Burchell's Coucal *Centropus burchelli***

Not previously recorded from the region, but now a common resident along the river banks. There does not appear to have been any change to its range elsewhere in South Africa.

**Squacco Heron *Ardeola ralloides***

It was not previously recorded in the region and is now an occasional visitor.

**Lesser Honeyguide *Indicator minor***

Its range has expanded westward along the Orange River banks.

**Hadedda Ibis *Bostrychia hagedash***

Its range has expanded westward to the edge of this region and beyond. It is now a common resident in the vicinity of the river and is sometimes seen in flocks of 50 or more birds. This is a continuation of a westward expansion that has taken place across South Africa.

**Brown-hooded Kingfisher *Halcyon albiventris***

It was not previously reported in the region and is now a resident along the river banks. There has been a general westward expansion in South Africa.

***Other range extensions or population increases*****Southern Pied Babbler *Turdoides bicolor***

Its range has expanded westward in the tall Camelthorn woodland along the dry Kuruman River bed. Elsewhere in South Africa, its range shows a slight southward expansion.

**Acacia Pied Barbet *Tricholaema leucomelas***

Its range has expanded westward, possibly in response to the establishment of gardens with tall alien trees around homesteads, as well as bush encroachment. There has been some contraction in the east of its South African range.

**Pirit Batis *Batis pririt***

There is some indication of an increase in density, possibly in response to bush encroachment.

**European Bee-eater *Merops apiaster***

There has been some range expansion into the north of the region. Elsewhere in South Africa, there appears to have been a southward expansion in the east and a range contraction in the south west.

**Bokmakierie *Telephorus zeylonus***

There appears to have been some expansion into the treeless western part of the region. Elsewhere in South Africa, it has extended the eastern edge of its range.

**Cinnamon-breasted Bunting *Emberiza tahapisi***

There appears to have been some range expansion into the southern fringes of the region, possibly only as a seasonal visitor. Its South African range shows a general small westward expansion.

**Golden-breasted Bunting *Emberiza flaviventris***

It occurs only in the eastern extremity of the region, where it has slightly expanded its range.

**Sickle-winged Chat *Cercomela sinuata***

There is an apparent northward expansion within the region. This may be partly due to identification issues, as it may be confused with the pale form of the Familiar Chat.

**Desert Cisticola *Cisticola aridulus***

It shows some westward expansion in the region, as well as generally in South Africa.

**Grey-backed Cisticola *Cisticola subruficapilla***

The range shows some northward expansion, both in the region and elsewhere in South Africa.

**Rattling Cisticola *Cisticola chiniana***

It was not previously recorded in the region, and is now resident on the western fringe. It shows a general westward expansion in South Africa, possibly related to bush encroachment.

**Long-billed Crombec *Sylvietta rufescens***

It has expanded its range in this region, in line with a general north-west expansion in the country as a whole. Within this region, it is most often associated with Swarthaak (*Acacia mellifera*) thickets, which are a manifestation of bush encroachment.

**Pied Crow *Corvus albus***

Its range has greatly expanded outward from its core around Upington, in line with a general expansion into the drier areas throughout South Africa.

**African Cuckoo *Cuculus gularis***

The range shows a westward expansion in the north. There appears to have been a general decline in South Africa, but expansion in the Free State.

**Black Cuckoo *Cuculus clamosus***

There has been a strong westward expansion in the north and west of the region, as well as expansion in the Free State province and a general increase in reporting rates across the country.

**Diderick Cuckoo *Chrysococcyx caprius***

The range shows some westward expansion in the north.

**Great-spotted Cuckoo *Clamator glandarius***

The range has expanded into the north of the region and shows a general contraction elsewhere in the country.

**Jacobin Cuckoo *Clamator jacobinus***

It shows some range expansion in the south of the region.

**Klaas's Cuckoo *Chrysococcyx klaas***

It was not previously reported in the region but is now established in the western fringe, and has generally expanded westward in the rest of the country.

**Red-eyed Dove *Streptopelia semitorquata***

Its range has expanded in the north of the region, possibly through exploitation of well-watered gardens with tall trees.

**Booted Eagle *Aquila pennatus***

It has been reported with increased frequency across the region.

**Scaly-feathered Finch *Sporopipes squamifrons***

Its reporting rates have increased and there is a southward expansion in the rest of the country.

**Grey Go-away-bird *Corythaixoides concolor***

There have been a few isolated sightings in the west of the region. It was not previously reported and does not seem to be established as a resident. It shows a general westward expansion in the rest of the country.

**Montagu's Harrier *Circus pygargus***

There has been an increase in the spread of sightings both in this region and in the central parts of the country.

**African Grey Hornbill *Tockus nasutus***

Its observed range has expanded in the north of the region.

**Common House-martin *Delichon urbica***

It was not reported in this region in the previous survey and there have been a few scattered records during this survey.

**Striped Kingfisher *Halcyon chelicuti***

There has been a westward expansion, possibly aided by bush encroachment or other afforestation.

**Karoo Korhaan *Eupodotis vigorsii***

It shows a northward expansion in the west of its range.

**Red-crested Korhaan *Eupodotis ruficrista***

Its range has expanded into the treeless centre of the red dune region.

### **Monotonous Lark *Mirafra passerina***

There is an apparent range expansion into the north of the region. The species is irruptive and the change is not necessarily a long-term trend.

### **Red-faced Mousebird *Urocolius indicus***

There has been some increase in its reporting rates, not only in this region but also in the rest of the country.

### **Common Myna *Acridotheres tristis***

The species has spread rapidly across South Africa and may be established as a resident around human settlements on the western fringe of this region. There have been some scattered sightings in the north of the region, but it does not seem to be resident there. It has not been reported along the densely settled banks of the Orange River, which would appear to be suitable habitat.

### **Neddicky *Cisticola fulvicapilla***

Its range has expanded into the western fringe of this region, in line with a general westward expansion, possibly in response to bush encroachment.

### **Pearl-spotted Owlet *Glaucidium perlatum***

There is some indication of a westward expansion in this region, despite a general decline across the country.

### **Red-billed Oxpecker *Buphagus erythrorhynchus***

It was not previously recorded in the region and there have been a few scattered sightings during this survey. There has been a westward and

southward expansion across South Africa, which has been assisted by the use of non-toxic dips by stock farmers.

### **African Palm-Swift *Cypsiurus parvus***

There has been some range expansion within the region, in line with a general expansion across South Africa, related to the increased availability of mature alien palm trees around human settlements.

### **Black-chested Prinia *Prinia flavicans***

There has been an increase in reporting rates across the region. In the rest of the country, there has been some range contraction in the south-west, and an increase in reporting rates elsewhere.

### **Green-winged Pytilia *Pytilia melba***

There is a slight indication of westward expansion, in this region as well as in the rest of the country.

### **Common Quail *Coturnix coturnix***

There appears to have been an increase in its abundance, but it is nomadic and irruptive, and the trend may be a short-term one.

### **Double-banded Sandgrouse *Pterocles bicinctus***

It appears to have expanded its range in the south and east.

### **Namaqua Sandgrouse *Pterocles namaqua***

Its reporting rates have increased in this region, but in the rest of the country its range has contracted in the south.



**Kalahari Scrub-robin *Cercotrichas paena***

Its range has expanded westward in this region, and in the rest of the country it has expanded slightly in all directions, possibly in response to bush encroachment.

**Shikra *Accipiter badius***

Its range appears to have expanded into the north of the region.

**Marico Sunbird *Cinnyris mariquensis***

Its range has expanded westward, possibly in response to bush encroachment or other afforestation.

**Dusky Sunbird *Cinnyris fuscus***

There has been a range expansion into the central, treeless part of the region, possibly in response to bush encroachment.

**Greater-striped Swallow *Hirundo cuculatus***

There has been an increase in reporting rates in the south of the region.

**Common Swift *Apus apus***

The species is abundant in the region during the rainy season. The apparent range expansion is due to under-reporting in the previous survey. This was possibly the most under-reported species during the SABAP1 survey (Brooke 1997).

**Brown-crowned Tchagra *Tchagra australis***

Its range has expanded westward into the study region, and its range has expanded around the edges in the rest of the country, probably in response to bush encroachment.

**Spotted Thick-knee *Burhinus capensis***

Its range appears to have expanded into the centre of the region.

**Groundscraper Thrush *Psophocichla litsitsirupa***

Its range shows a slight westward expansion.

**Ashy Tit *Parus cinarascens***

There has been an increase in reporting rates, possibly as a result of bush encroachment and the increased use of man-made structures (especially hollow poles) for nesting.

**Lappet-faced Vulture *Torgos tracheliotus***

Its population and foraging range have increased, probably as a result of a decrease in persecution by farmers. It has declined in the Kruger national Park over the same period.

**White-backed Vulture *Gyps africanus***

Its population and foraging range have increased, probably as a result of a decrease in persecution by farmers.

**Rufous-eared Warbler *Malcorus pectoralis***

There has been an increase in its reporting rates across the region.



**Black-faced Waxbill *Estrilda erythronotus***

Its range shows a westward expansion.

**Violet-eared Waxbill *Granitina granitina***

Its range shows a westward expansion.

**Green Wood-hoopoe *Phoeniculus purpureus***

Its range shows a westward expansion in this region, as well as in the country as a whole, possibly as a result of aforestation.

**Bennett's Woodpecker *Campethera bennetti***

There has been some westward expansion of its range.

**Golden-tailed Woodpecker *Campethera abingoni***

The westward expansion of its range in this region and elsewhere in South Africa may be related to aforestation (other than bush encroachment).

***Range contractions or population declines*****Pied Avocet *Recurvirostra avosetta***

The range appears to have contracted not only in this region, but also in the rest of the country. The available habitat is subject to frequent fluctuations, so this is not necessarily a long-term trend.

**Bateleur *Terathopius ecaudatus***

There have been no sightings during the present survey and it may be locally extinct. It still occurs in the neighbouring Kgalagadi Transfrontier Park. Within South Africa, it is increasingly restricted to the larger conservation areas.

**Cape Bunting *Emberiza capensis***

There is some indication of a possible northward range contraction.

**Jackal Buzzard *Buteo rufofuscus***

Its range may have contracted in the south of the region, and a general southward contraction in the rest of the country.

**White-throated Canary *Crithagra albogularis***

There appears to have been a slight contraction southward.

**Familiar Chat *Cercomela familiaris***

There appears to have been some range contraction out of the rocky west of the region.

**Tractrac Chat *Cercomela tractrac***

It shows a southward range contraction.

**Red-knobbed Coot *Fulica cristata***

There is an apparent range contraction in this region, as well as in the rest of the country, some contraction around the edges of its range.

**Burchell's Courser *Cursorius burchelli***

The species seems to have almost vanished from the region and shows a general decline across the country.

**Double-banded Courser *Rhinoptilus africanus***

Although still fairly common, there is evidence for a decline, not only in this region, but also across the rest of the country.

**Laughing Dove *Streptopelia senegalensis***

There has possibly been a slight decline.

**Red-necked Falcon *Falco chiquera***

It appears to have declined in the south.

**Common Fiscal *Lanius collaris***

Its reporting rates have declined in this region. In the rest of the country it shows a general decline (possibly related to bush encroachment) but with some eastward expansion.

**Chat Flycatcher *Bradornis infuscatus***

There is slight evidence for a decline.

**Fairy Flycatcher *Stenostera scita***

Its range has contracted in this region and there has been a general decline across the country.

**Southern Pale-chanting Goshawk *Melierax canorus***

Although it remains common, there may have been a decline.

**Common Greenshank *Tringa nebularia***

There has been a decline in sightings from this region.

**Black Harrier *Circus maurus***

It shows a range contraction away from the western edge of the region. Because it occurs in the study area seasonally, this may be an artefact of the seasonality of coverage.

**Greater Kestrel *Falco rupicoloides***

It has declined in the region and over much of its South African range.

**Rock Kestrel *Falco rupicolis***

It shows a sharp decline in the study area and a moderate decline over the rest of the country.

**Brown-throated Martin *Riparia paludicola***

It has possibly declined here but there is some indication of northward expansion in the rest of the country.

**Southern Masked-weaver *Ploceus velatus***

It appears to have declined in the central treeless part of the region but shows a general increase in the rest of the country.

**African Pipit *Anthus cinnamomeus***

It shows an eastward range contraction in the region, but an increase across the rest of the country.

**Kittlitz's Plover *Charadrius pecuarius***

The apparent decline may be due to short-term fluctuations.

**Three-banded Plover *Charadrius tricollaris***

The apparent decline in the study area may be due to short-term fluctuations in abundance. There has been some eastward range contraction in the rest of the country.

**Secretarybird *Sagittarius serpentarius***

There has been a range contraction in the east of the region, along with a decline across the country, which may be linked to bush encroachment and general pasture degradation.

**Lesser Grey Shrike *Lanius minor***

The apparent range contraction out of the west of this region may be an artefact of the seasonality of coverage. The range has expanded southward elsewhere in the country.

**Cape Sparrow *Passer melanurus***

It shows a slight decline across the region but expansion in the east of its South African range.

**House Sparrow *Passer domesticus***

Its range has contracted across the region. This may be in response to human migration out of the farmlands.

**Black-eared Sparrow-lark *Eremopterix australis***

Its range has contracted southward, along with a general decline in the rest of the country. It is nomadic and irruptive, and the decline may reflect short-term fluctuations.

**Grey-backed Sparrow-Lark *Eremopterix verticalis***

Although still an abundant species, it shows some decline in the east of this region, but eastward range expansion in the rest of South Africa.

**Cape Glossy Starling *Lamprotornis nitens***

There has been some contraction out of the centre of the region, but a slight expansion elsewhere in the country.

**Pale-winged Starling *onchnognathus nabourop***

There has been a range contraction southward and a decline over much of its South African range.

**Wattled Starling *Creatophora cinerea***

There has been some range contraction out of the north of this region and expansion southward elsewhere in South Africa.

**Cape Wagtail *Motacilla capensis***

There has been a southward range contraction, possibly related to human population movement out of the farmlands.

**Cinnamon-breasted Warbler *Euryptila subcinnamomea***

There appears to have been a range contraction out of the south west.

**Common Waxbill *Estrilda astrild***

There has been a southward range contraction.

**Capped Wheatear *Oenanthe pileata***

Its reporting rates have declined across the region.

**Mountain Wheatear *Oenanthe monticola***

There has been a westward contraction of its range in this region and a southward contraction of its South African range.

**Other trends**

**Cape Crow *Corvus capensis***

The species disappeared from the region prior to the first survey and current data confirm its local extinction. Its South African range has contracted southward.

**Tawny Eagle *Aquila rapax***

It has maintained its range within the stock-farming part of this region, despite a decline elsewhere in South Africa, where it is now mostly confined to the larger conservation areas.

**Pygmy Falcon *Polihierax semitorquatus***

It shows a decline in the centre and an increase in the south of the region.

**Red-billed Quelea *Quelea quelea***

The range shows no change in this region, while there has been a westward expansion in the rest of the country.

**Crimson-breasted Shrike *Laniarius atrococinctus***

There has been a westward decline and an eastward expansion of its range. Elsewhere in the country there appear to be alternating areas of expansion and contraction around the edge of its range.

**Black-chested Snake-eagle *Circaetus pectoralis***

There has been no discernible range change in the study region, but a southward expansion elsewhere in the country.

**Southern Grey-headed Sparrow *Passer diffusus***

There appears to have been no change here, but a general increase and southward expansion in the rest of the country.

**White-browed Sparrow-weaver *Plocepasser mahali***

There is no apparent change in the study area, but there seems to have been a general expansion of the edges of its range in the rest of the country.

## Discussion

The most striking range expansions have been those of species which were not recorded in the region during the first survey (SABAP1) and have become resident and even common along the banks of the Orange River and vicinity. These range expansions can be attributed to habitat modification, and specifically to the creation of a mosaic of vineyards, open fields, well-watered gardens with tall trees and riverine thickets.

The westward expansion of some bush-loving birds can be ascribed to bush encroachment, but the range expansion of some woodland birds which are generally associated with mature trees rather than scrub may be due to afforestation in the form of the establishment of mature alien trees around homesteads. There is also some anecdotal evidence of afforestation in the form of greater numbers of mature indigenous trees (particularly Camelthorn *Acacia erioloba*) in the west of the region. If this is so, it must be due to either above average rainfall locally during recent decades, or to a reduction in tree-felling (there has been a decline in the human population in the rural areas, resulting in reduced pressure on timber and firewood resources).

The range expansions of six cuckoo species are curious because they do not appear to be related to range changes of the regular host species. They may be related to afforestation other than bush encroachment (these species are generally associated with mature woodland rather than scrub). Perhaps coverage of the region during the first atlas survey was concentrated outside of the mid-summer period (when they are present and calling), but the changes seem to be too pronounced to be purely an artefact of the seasonality of coverage.

The fortunes of birds of prey in the region appear to be mixed. The marked increases in populations of Lappet-faced and White-backed Vultures may be due to the reduction in the use of poisoned baits to

control predators and in the reduction of direct persecution. These developments may be at least partly due to the vulture awareness campaign carried out in the region by the late Abrie Maritz. On the other hand, some farmers in the region are still reported to consider all birds of prey as 'Lammervangers' (lamb-catchers) and to shoot them on sight. The Booted Eagle appears to have increased across the region, the Tawny Eagle has maintained a stable population. The Bateleur and Rock Kestrel have declined sharply.

The differences in protocol and in grid size (quarter degree squares in SABAP1 and pentads in SABAP2) may influence the differences in reporting rates. In particular, one might expect species that occur at low densities to have lower reporting rates and species that occur at high density to have higher reporting rates on the finer grid (SABAP2). However, the lists of species that show the greatest changes in reporting rates between the two surveys over the whole SABAP region (Underhill & Brooks 2014) included a mix of species that occur at high and at low densities, indicating that if such a bias exists, it is not strong.

Because of the more demanding protocol of SABAP2 compared to SABAP1, the team of contributors to SABAP2 is smaller but possibly more dedicated and more skilled. There may therefore be an observer effect, whereby the less conspicuous species may be reported at a higher rate in SABAP2. It has been pointed out, however, that the average length of checklists submitted hardly differs between the two surveys, again indicating that if such a bias exists, it is not large (Loftie-Eaton 2015).

For several species, the range change maps show a chequerboard pattern of alternating red (for species present in SABAP1 and not SABAP2) and blue (present in SABAP2 and not SABAP1) cells in the study area. This may indicate nomadism by the species, but more likely it indicates that the data for the species in both surveys were inadequate to comprehensively describe its range at the quarter degree square level. The combined data of both surveys for the study

area probably represents the best possible estimate of the true range in those cases.

It may be possible to investigate the potential biases due to the grid effect and the observer effect by checking where there is a big difference in reporting rates for a species between SABAP1 and SABAP2, whether the same trend can be detected in the year to year data within SABAP2. That analysis cannot be done in this study area, due to the scarcity of year-to-year data, but could be done for the more data-rich regions.

As the natural vegetation in the vicinity of the Orange River has increasingly been replaced by intensive agriculture and especially vineyards, cats have been introduced to control rats in the vineyards. Many of these have become feral, and their numbers have not been controlled. Despite the increase in feral cats, the avian diversity in that environment appears to have increased rather than decreased. A study in Pretoria similarly found that the presence of a high density of domestic cats in the suburban environment did not appear to have an impact on bird populations (Parker 2012).

It appears that there have been more range expansions (or population increases) than range contractions (or population declines). This may be because range contractions and population declines are more difficult to detect than expansions or increases.

Data collection within the study area is continuing, and this analysis should be repeated once substantially more data are available.

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