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BIRD DISTRIBUTION DYNAMICS

BIRD DISTRIBUTION DYNAMICS 7 – SOCIABLE WEAVER *PHILETAIRUS SOCIUS* IN SOUTH AFRICA

H. Dieter Oschadleus[1], María López Gómez[1,2] and Michael Brooks[1]*

[1] Animal Demography Unit, Department of Biological Sciences, University of Cape Town, Rondebosch, 7701 South Africa

[2]Global Training Programme, University of the Basque Country, Gipuzkoa Campus, Donostia, San Sebastián, 20018 Spain

[*]Email: doschadleus@gmail.com

Introduction

This is the seventh paper of the series in *Biodiversity Observations* dealing with the dynamics of bird distributions. The objectives are to report on the ranges of bird species as revealed by the Second Southern African Bird Atlas Project (SABAP2, 2007–) (Underhill 2016) and to describe how these ranges have changed since the first bird atlas (SABAP1, mainly 1987–91). The two bird atlas projects are about two decades apart.

This series of papers is also made feasible by the development of two new standards for the presentation of maps, firstly pentad-scale distribution maps derived from SABAP2 data, and secondly range-change maps showing how distributions have changed between SABAP1 and SABAP2 (Underhill & Brooks 2016a, b). Because the papers in this series use these new maps, the rules for interpretation are not provided in detail in each paper in this series.

This paper deals with the Sociable Weaver *Philetairus socius*, a weaverbird of the family Ploceidae (Figure 1). This African species has a "Least Concern" threat status. It does not wander far from its conspicuous nest (Mendelsohn & Anderson 1997), and is thus unlikely to be overlooked or misidentified.

Figure 1. Sociable Weaver, Louivale Farm, north of Carnarvon, Northern Cape. Photograph © Ryan Matthew Tippett from the BirdPix section of the ADU Virtual Museum (see http://vmus.adu.org.za/?vm=BirdPix-8458).

Sociable Weaver *Philetairus socius*

Background to the species

The Sociable Weaver is a distinctive species of arid savanna woodland in southern Africa (Mendelsohn & Anderson 1997). Its range is from Etosha in northern Namibia south to south-western Botswana, to north-eastern South Africa (Northern Cape, North West Province and Free State), but it is absent from most of the North West Province. This weaver is usually found in small flocks near its massive colonies which are conspicuous and last a long time (Hockey et al. 2005).

Populations have expanded in distribution during the 20th century, using telephone poles, electricity pylons and other artificial structures as nest sites (Mendelsohn & Anderson 1997). The earliest reference to a man-made nest site is from Postmasburg (Sclater 1927). However, this expansion appears to be limited to niches within its broad distribution. In recent years, however, the Sociable Weaver appears to be moving south with telephone poles as nest sites, along some roads in the southern part of its range (Oschadleus 2015).

The distribution of the Sociable Weaver shown in McLachlan & Liversidge (1957) is inaccurate, filling in the Namib, only extending as far south as the Orange River, and not extending east into Botswana in the far eastern part of its range. Rudebeck (1956) conducted an extensive survey of the Sociable Weaver, which has not been matched since. Rudebeck plotted all the colonies he found, and also, unusually, plotted absences (Figure 2).

Rudebeck (1956) did not visit the Ghaap Plateau but noted that other authors had not recorded the species there. It is not known whether this weaver occurred there historically. Mendelsohn & Anderson (1997) noted that the gap north of the Ghaap Plateau coincided with extensive clearance of Acacia veld for dryland crop farming.

A limitation to range expansion is high rainfall – after strong rains, the nests may become so soaked and heavy that the branches break (Fleck 1894). As areas of aridity increase, however, the Sociable Weaver could colonise these areas if other factors are suitable. Another limitation to range expansion, is the availability of nest material, in the form of stiff grasses such as *Aristida ciliata* (Maclean 1973).

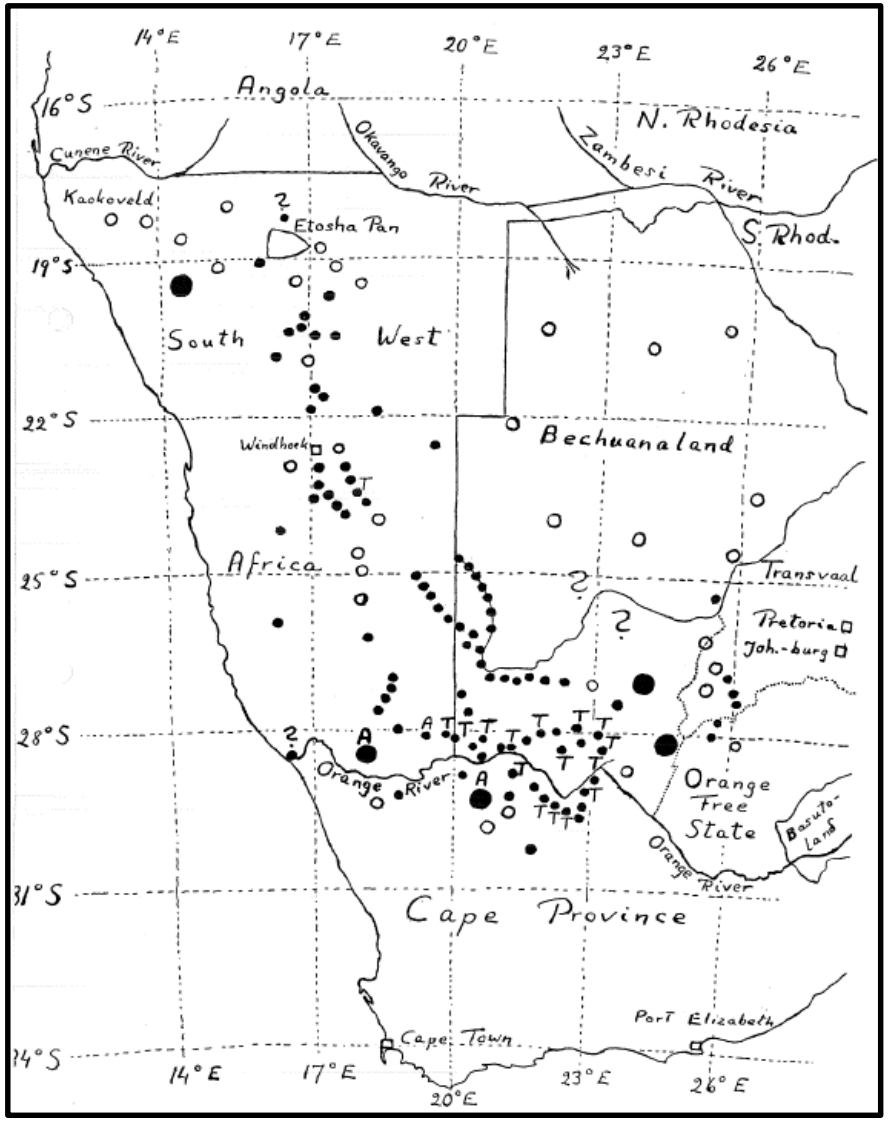

Figure 2. Rudebeck's (1956) map of Sociable Weaver colonies (filled circles) and absences (unfilled circles). Nests marked A are in Aloe dichotoma *trees and T indicates telephone pole nest sites.*

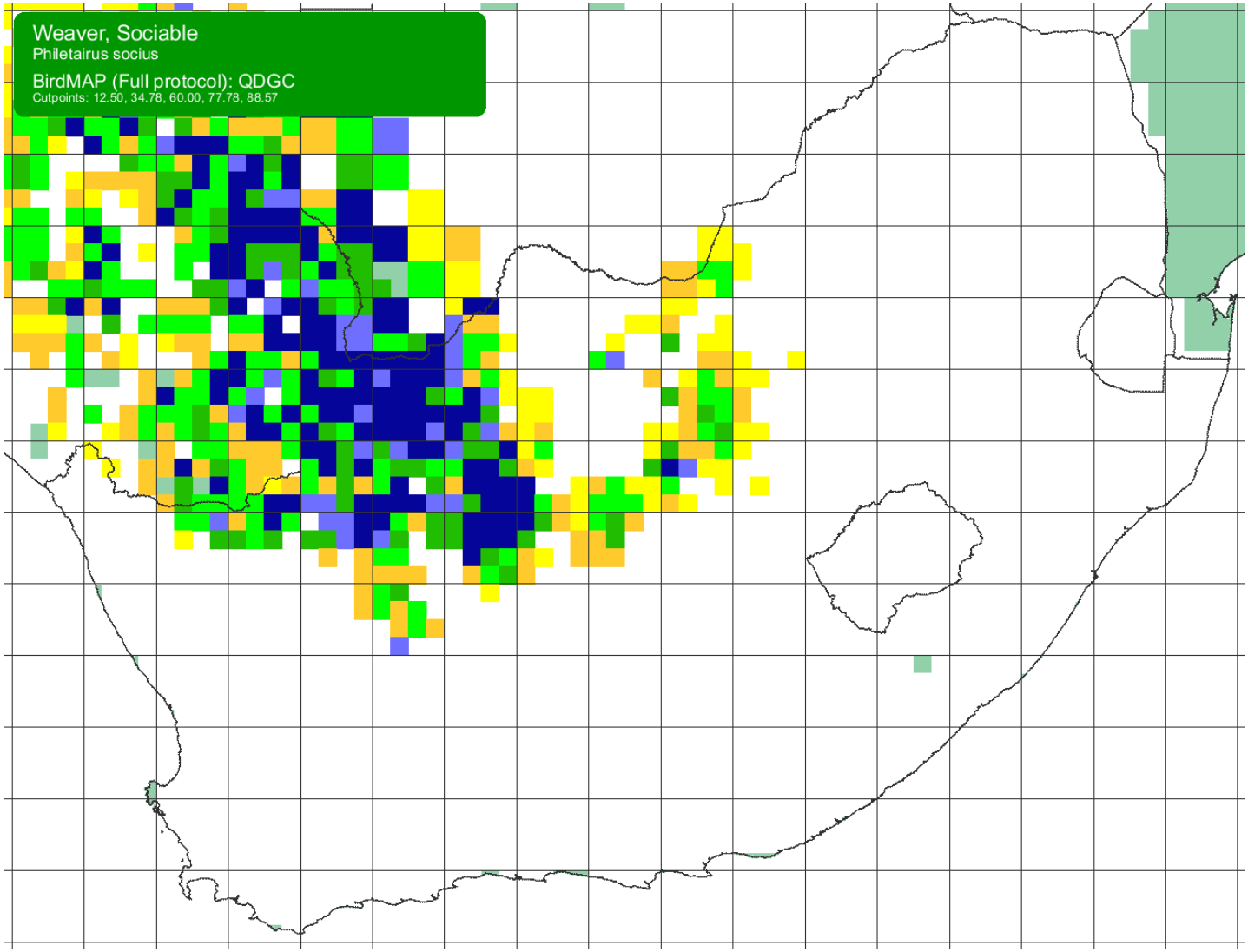

Figure 3. The SABAP1 distribution map for the Sociable Weaver. The sale is the quarter-degree grid cell, except in Botswana, where half-degree grid cells were used. Cells shaded turquoise, including the one in the former Transkei, had no SABAP1 data.

SABAP1 distribution

The SABAP1 distribution (Figure 3) showed an axis of highest reporting rates from about Prieska in the Northern Cape, north-westwards across the southern Kalahari biome (Allan et al. 1997) into southeastern Namibia, with lower reporting rates on either side of this main axis. The species is absent from the Ghaap Plateau, the conspicuous hole in the distribution. The SABAP1 distribution stretches as far as 31°S. Although the Rudebeck (1956) map shows the range stopping at about 30 S (Figure 2), he specifically noted that he did not check the southernmost part of the range

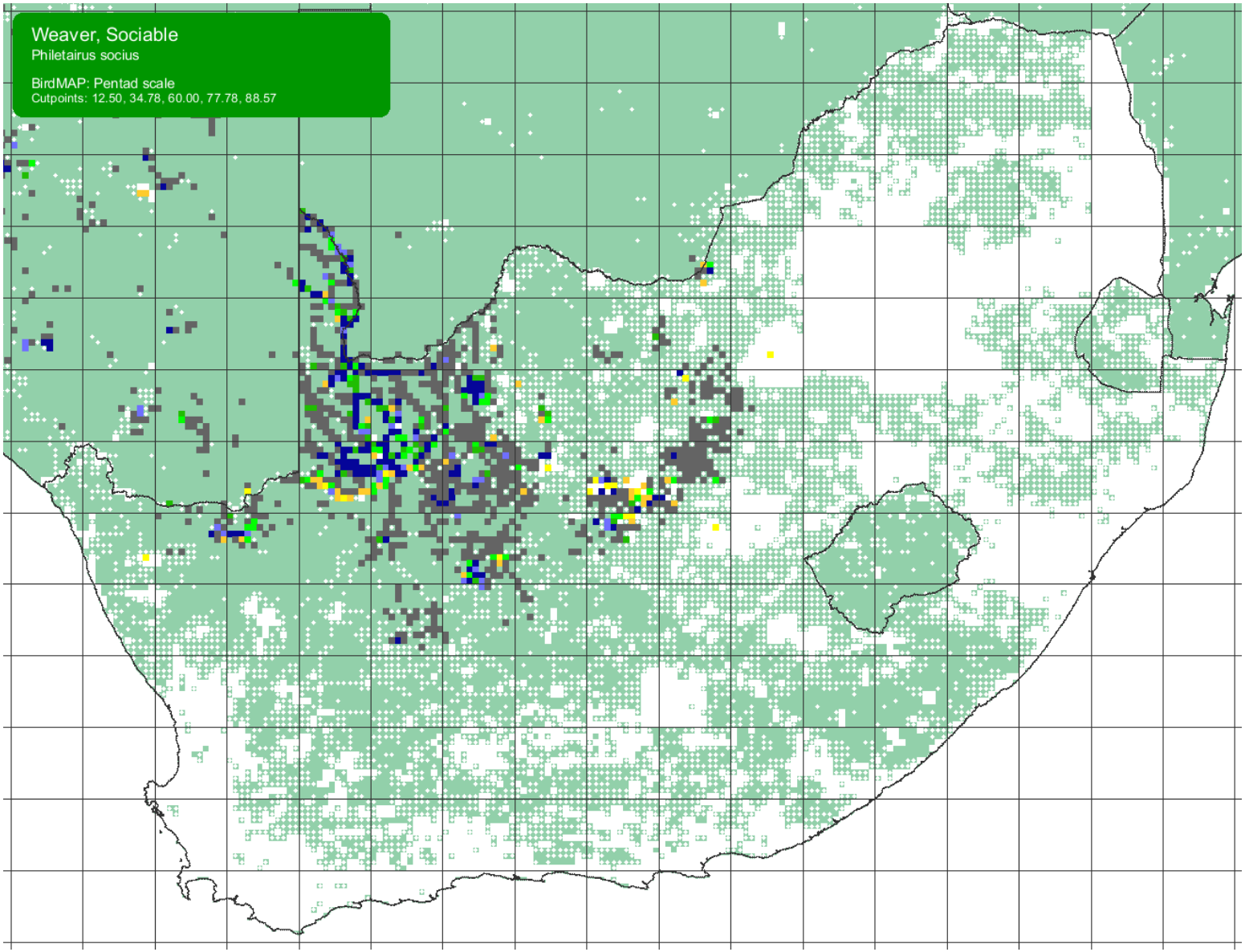

Figure 4: SABAP2 distribution map for the Sociable Weaver, downloaded 12 December 2016. The detailed interpretation of this map is provided by Underhill & Brooks (2016a). Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–12.5%, orange 12.5–34.8%, light green 34.8–60.0%, dark green 60.0–77.8%, light blue 77.8–88.6 and dark blue 88.6–100%. In pentads shaded grey or with white dots, there are one, two or three full protocol checklists, or there are ad hoc lists, or incidental records. In pentads shaded grey, the species was recorded as present; in pentads with white dots the species has not been recorded. If a pentad has four or more checklists, and the species has been recorded on an ad hoc checklist or as an incidental recorded, it is shaded yellow, indicating that the species has a small reporting rate.

SABAP2 distribution

The pentad scale distribution map, showing the SABAP2 data, has much of the distribution of the Sociable Weaver represented in grey (Figure 4). This means that most pentads in which the Sociable Weaver occurs, do not yet have four full protocol checklists, the minimum at which reporting rates start to become reliable. There are still also many gaps in coverage within the range of the Sociable Weaver, so that the distribution, incorrectly, appears to be fragmented. At this stage, Figure 4 largely serves as a presence/absence map of the distribution of the Sociable Weaver in South Africa; there is little atlas data to date in the known Namibian range. There is one out of range record in Figure 4, to the east of the normal range. It lies in pentad 2645_2630, near Klerksdorp, North West, and was made on 14 April 2010 by Tony Archer. A single bird was observed, and although he has checked for Sociable Weavers on each subsequent visit to the locality, the species has not been recorded again. Isolated records of wandering birds are precisely what we would anticipate in well-atlased pentads.

Range change between SABAP1 and SABAP2

In Figure 5, the approach described in Underhill & Brooks (2016b) was used to classify the quarter degree grid cells into six categories of increase and decrease. The relative increases and decreases are estimated using the Griffioen transformation (Underhill & Brooks 2016b), and involve an assumption that, in pentads where Sociable Weavers occur, they are randomly distributed across the landscape, i.e. they are not clustered or in flocks. For the Sociable Weaver, this is probably at best only partially true, so the results need to be treated with some caution. However, the qualitative results are likely to be correct.

Table 1. Range-change summary for the Sociable Weaver between SABAP1 and SABAP2. The table provides a count of the number of quarter degree grid cells of each colour in Figure 5. Also shown are the same summaries when the analysis is restricted to grid cells with at least 30 checklists for both SABAP1 and SABAP2.

Status	**Four checklists for SABAP1 & SABAP 2**		**30 checklists for SABAP1 & SABAP 2**	
	Count	**%**	**Count**	**%**
Red (very large decrease)	68	25	11	33
Orange (large decrease)	33	12	1	3
Yellow (small decrease)	34	13	3	9
Light green (small increase)	40	15	9	27
Dark green (large increase)	36	13	5	15
Blue (very large increase)	61	22	4	12
Total	272	100	33	100

Results are shown in Figure 5 for only the 272 quarter degree grid cells for which there are four or more checklists for both SABAP1 and SABAP2 and in which Sociable Weaver occurred in either SABAP1 or SABAP2 (Table 1). In other words, grid cells in which Sociable Weaver did not occur in either project are excluded in this analysis.

Of these 272 quarter degree grid cells, 68 (25%) are red, and 33 (12%) are orange. This suggests very large (red) or large (orange) decreases in 37% of the quarter degree grid cells. The numbers of grid cells shaded blue (very large increase) and dark green (large increase) are 61 (22%) and 36 (13%) respectively, giving a total of 35%. The apparent decreases slightly outweigh the apparent increases.

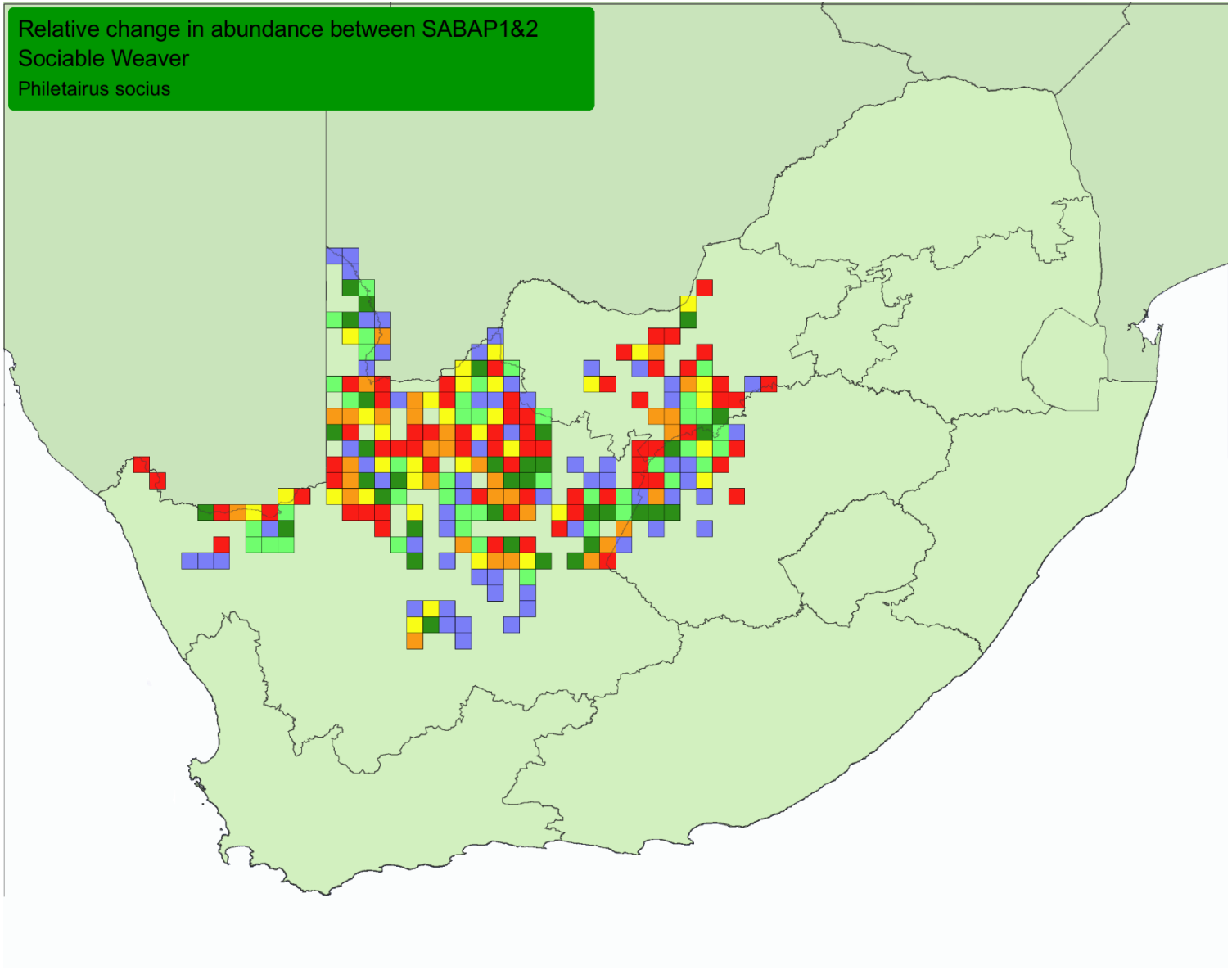

Figure 5: Range-change map between SABAP1 and SABAP2 for the Sociable Weaver, downloaded 12 December 2016. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 1. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. All these gird cells had Sociable Weaver recorded in them either in SABAP1 or in SABAP2 or in both. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

The groups of blue and dark green grid cells where large increases might have occurred include the Springbok area, the area north of the Carnarvon to Britstown road, near Barkly West (on the southern edge of the Ghaap plateau), and in the northernmost part of the Kgalagadi Transfrontier Park. Large decreases appear to have occurred along the lower Orange River, in the area from Augrabies Falls National Park to Kakamas, and the area south of Christiana.

Repeating the quantitative analysis of Figure 5 and Table 1 using grid cells with 30 or more checklists in both SABAP1 and SABAP2, the sampling error is considerably smaller than with four or more checklists for both projects, but there are now only 33 grid cells for Sociable Weavers which meet this criterion (Table 1). This shrinkage of sample size means that 239 of the 272 in the analysis described above had between four and 29 checklists for either SABAP1 or SABAP2. Most of these remaining 33 grid cells are in and around centres of human population (pers. obs), and therefore potentially not a representative sample of grid cells within the distribution. However, in this severely restricted analysis, 36% of grid cells show large or very large decreases, and 27% show large or very large increases. The apparent decreases outweigh the apparent increases as in the “four-checklists” analysis.

Both sets of results in Table 1 need to be treated with caution. The “four-checklist” analysis has many grid cells with small numbers of checklists, and therefore prone to sampling error. On the other hand, the “30-checklist analysis” is spatially not representative.

Conclusions

It is likely that the best available distribution map for the Social Weaver remains that from SABAP1 (Figure 3). The range change analysis of Figure 5 and Table 1 needs to be treated as provisional, suggesting hypotheses for further investigation. Figure 6 shows the SABAP2 distribution overlaid over the SABAP1 distribution. In the southern part of its range, the Sociable Weaver appears to be moving south, but only slightly.

There remains a large gap in range of the Sociable Weaver around the Ghaap plateau, between Danielskuil and Vryburg. The weaver appears to have been absent from here for at least 100 years, based on the discussion in Rudebeck (1956). There are new records (SABAP2) in the southern part of this gap, i.e. north-west of Barkley West, indicating that the Sociable Weaver may be colonising this area northwards (Figure 6).

Coverage of the range of the Sociable Weaver is generally poor. A large amount of atlas fieldwork is required before we can claim to be able to adequately monitor changes in the status and range of the Sociable Weaver. If it were not for the initiative by Vincent Parker (Underhill et al. 2016) to radically improve coverage of the part of the Northern Cape which coincides well with the range of the Sociable Weaver, the vision of foundational coverage of four checklists per pentad over the range of this species would not be achievable. In contrast, about 90% of the range of the Cape Weaver *Ploceus capensis* is almost entirely contained within the pentads with four or more checklists, so that reporting rates can be estimated, and the pentads can be shown in colour, rather than grey (HD Oschadleus in prep.). Most of the range of the Sociable Weaver is represented in grey (Figure 4).

With its enormous nest structures, the Sociable Weaver is a unique species, an avian engineer. The nests modify climate within the nest chambers, and create substantial areas of shade beneath the nests. Besides the weavers themselves, these structures are exploited and taken advantage of by a remarkable diversity of animals (e.g. Rymer et al. 2014). Thus bird atlas monitoring of the Sociable Weaver is an important initiative, with interest and significance beyond this single species of bird.

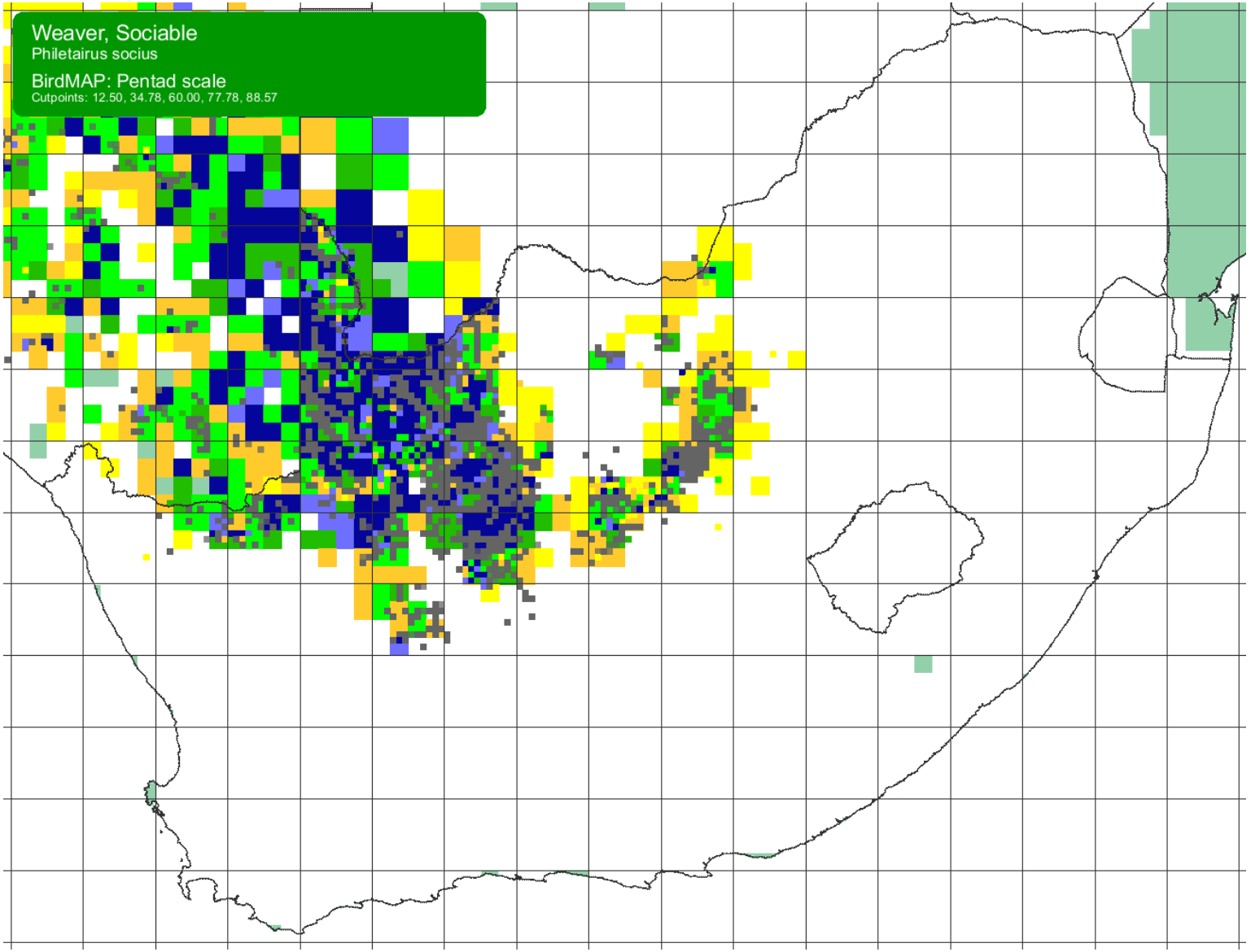

Figure 6. Joint SABAP1 and SABAP2 distribution map for the Sociable Weaver. The SABAP2 distribution map (Figure 4) has been overlaid on the SABAP1 distribution (Figure 3). This representation clearly shows individual SABAP2 pentads which represent records of occurrence outside the SABAP1 distribution

Acknowledgements

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