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BIRD DISTRIBUTION DYNAMICS 11 – THE STORKS OF SOUTH AFRICA, LESOTHO AND SWAZILAND

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BIRD DISTRIBUTION DYNAMICS

BIRD DISTRIBUTION DYNAMICS 11 – THE STORKS OF SOUTH AFRICA, LESOTHO AND SWAZILAND

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Introduction

This is the 11th paper on bird distribution dynamics in *Biodiversity Observations.* The objective of this series of papers is to report on the ranges of bird species as revealed by the Second Southern African Bird Atlas Project (SABAP2, 2007 onwards) and to describe how their ranges have changed since the first bird atlas (SABAP1, mainly 1987–1991), 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 two new maps, the rules for interpretation are not provided in detail in each paper in this series.

In this paper, we deal with the seven species of storks that occur in South Africa, Lesotho and Swaziland. For each species, four items of information are presented: the SABAP1 distribution map using quarter-degree grid cells, the SABAP2 distribution map, using pentads (five-minute grid cells, so there are nine pentads per quarter-degree grid cell), the range-change map, showing estimated changes in relative abundance between SABAP1 and SABAP2, and a table which provides counts of the numbers of grid cells shaded each of six colours in the range change map. In contrast to earlier papers in this series, minimal commentary on each species is provided. We plan, ultimately, to return to doing comprehensive species accounts for individual species, as done for the first 11 papers in the Bird Distribution Dynamics series in *Biodiversity Observations.*.

Figure 1. Marabou Stork, Lake Naivasha, Kenya. Photographer © Pieter Cronje. Record 2660 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-2660

Marabou Stork *Leptoptilos crumeniferus*

At the time of SABAP1, the core of the distribution of the Marabou Stork (Figure 1) in South Africa was the Kruger National Park (Figure 2). The SABAP2 distribution is striking for the scattered records of the species in many parts of the country (Figure 3). Between SABAP1 and SABAP2, the Marabou Stork has decreased in the Kruger National Park (Figure 4). Decreases appear to outweigh increases (Table 1).

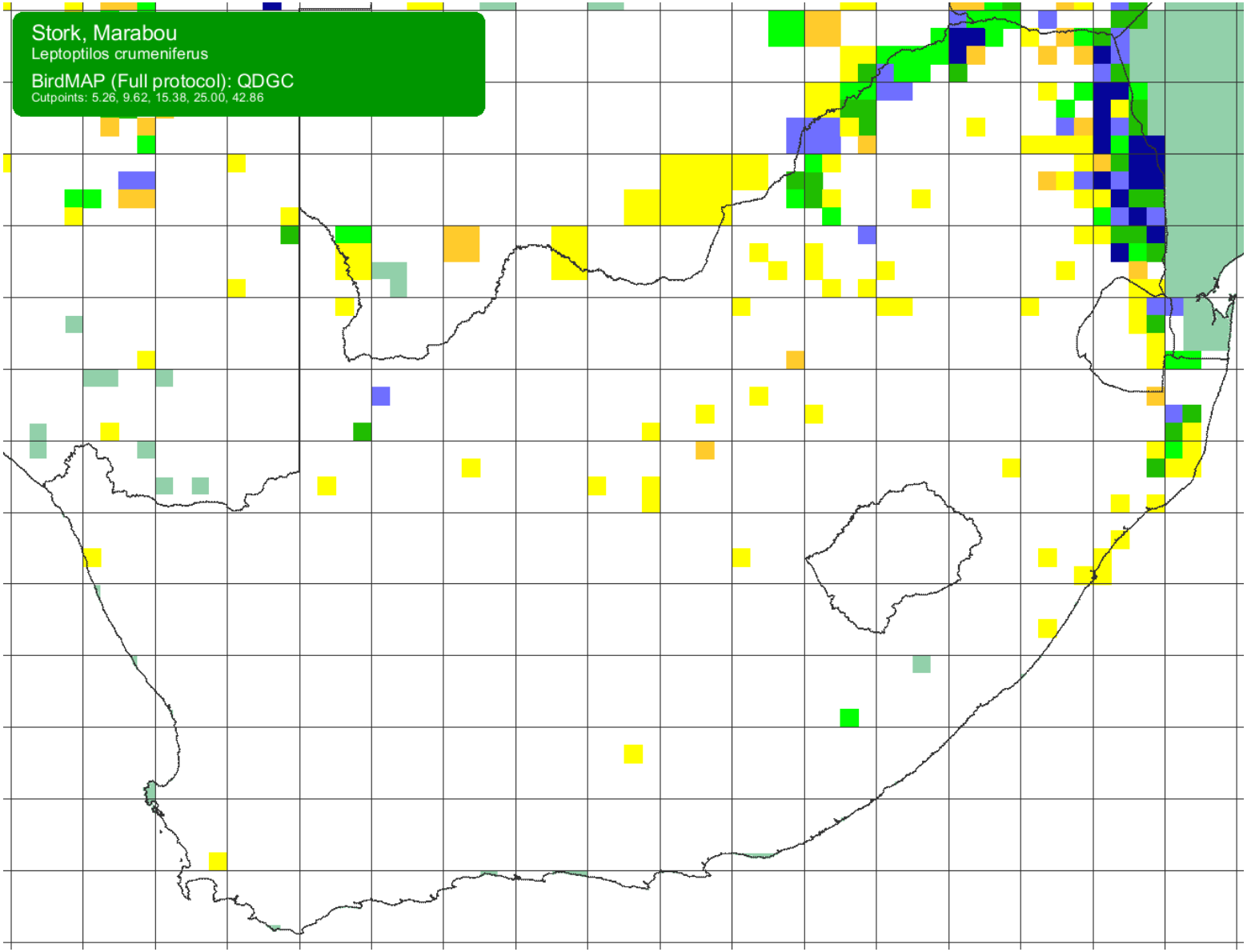

Figure 2. SABAP1 distribution map for the Marabou Stork. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 3.

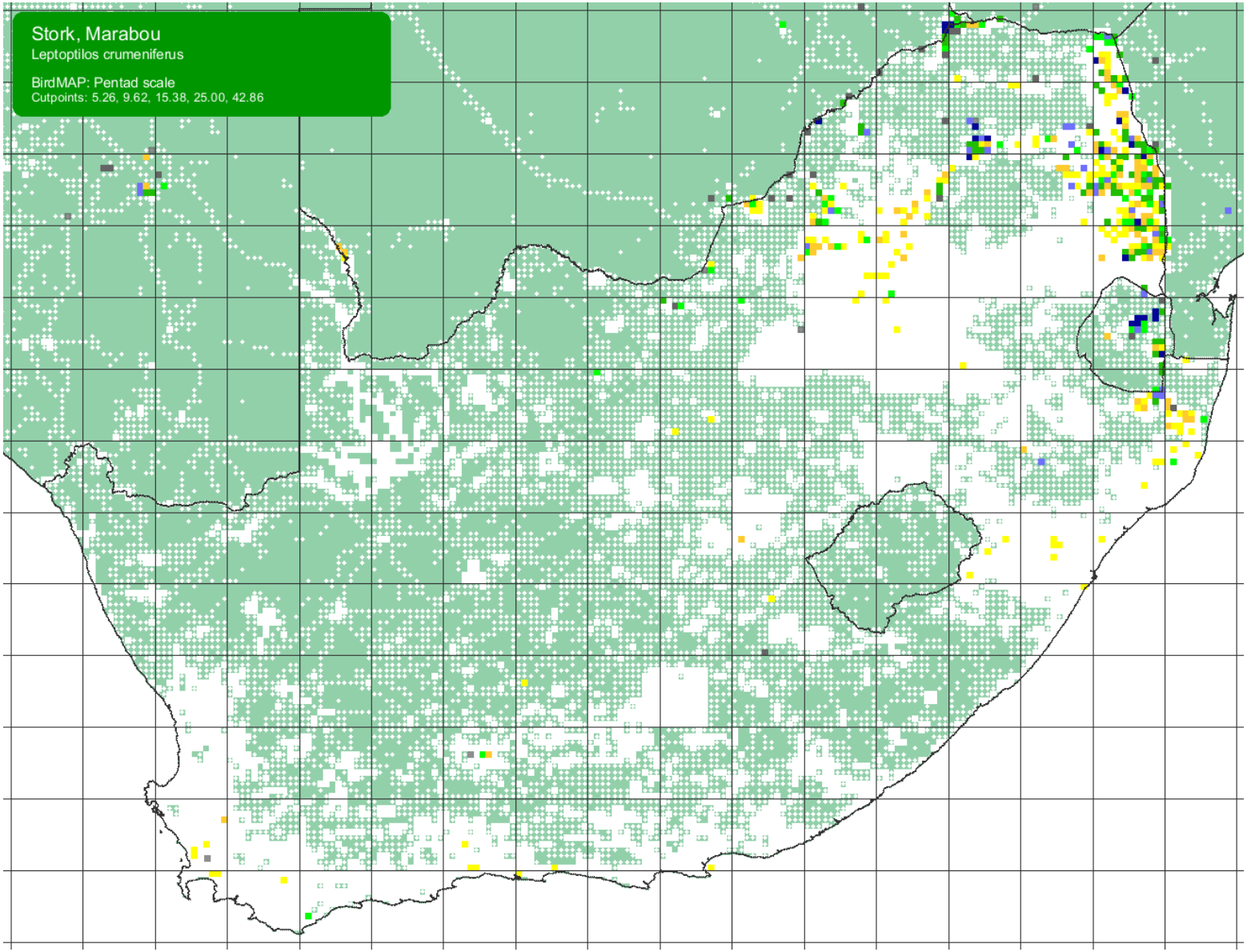

Figure 3. SABAP2 distribution map for the Marabou Stork, downloaded 4 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–5.3%, orange 5.3–9.6%, light green 9.6–15.3%, dark green 15.3–25.0%, light blue 25.0–42.9% and dark blue 42.9–100%.

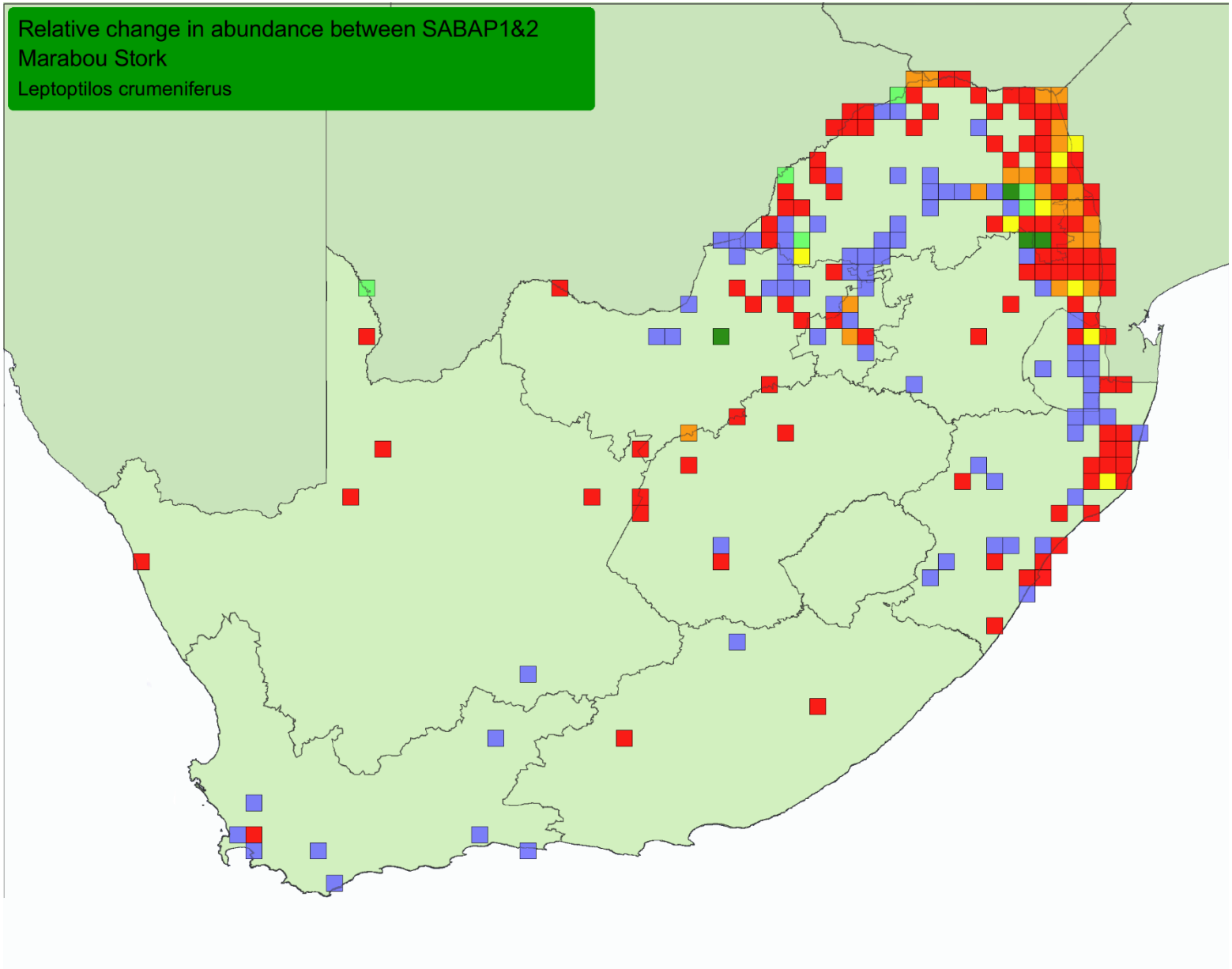

Figure 4. Range-change map between SABAP1 and SABAP2 for the Marabou Stork, downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small 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. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 1. Range-change summary for the Marabou Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 4, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	**4+ checklist for SABAP1 and SABAP2**		**30+ checklist for SABAP1 and SABAP2**	
	Count	%	Count	%
Red (very large decrease)	105	48	67	44
Orange (large decrease)	22	10	22	14
Yellow (small decrease)	8	4	6	4
Light green (small increase)	6	3	3	2
Dark green (large increase)	4	2	4	3
Blue (very large increase)	76	34	52	34
Total	221	100	154	100

Figure 5. African Openbill, South Luangwa National Park, Zambia. Photographer © Derek Solomon. Record 6120 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-6120

African Openbill *Anastomus lamelligerus*

The African Openbill (Figure 5) occurred mainly in the protected areas in the northeast of South Africa during SABAP1 (Figure 6). In 2010 there was an unprecedented irruption of African Openbills across the whole of South Africa (Figure 7). This single year irruption distorts the range-change map (Figure 8, Table 2). Over the core of its SABAP1 distribution, the African Openbill appears to be mainly decreasing.

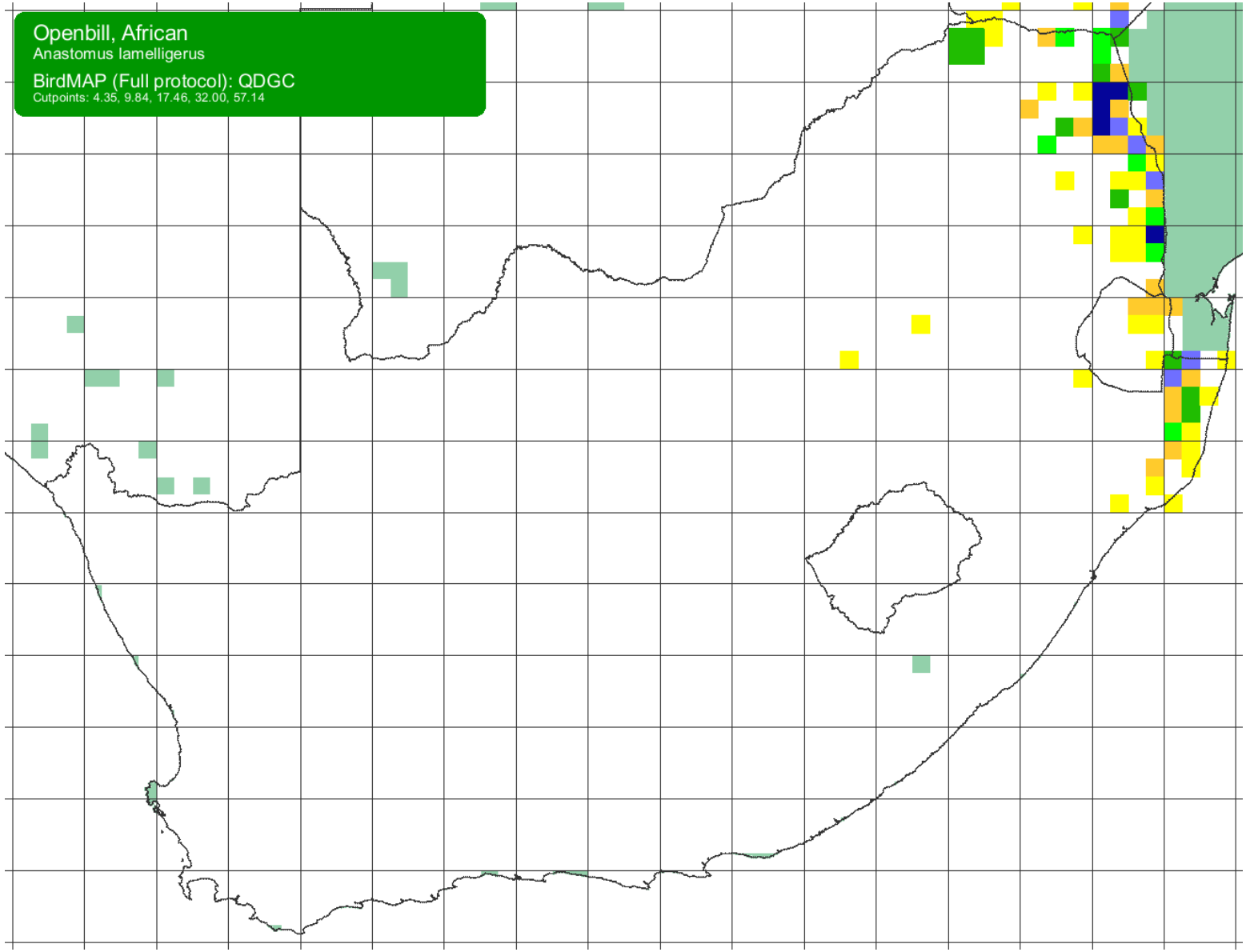

Figure 6. SABAP1 distribution map for the African Openbill. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 7.

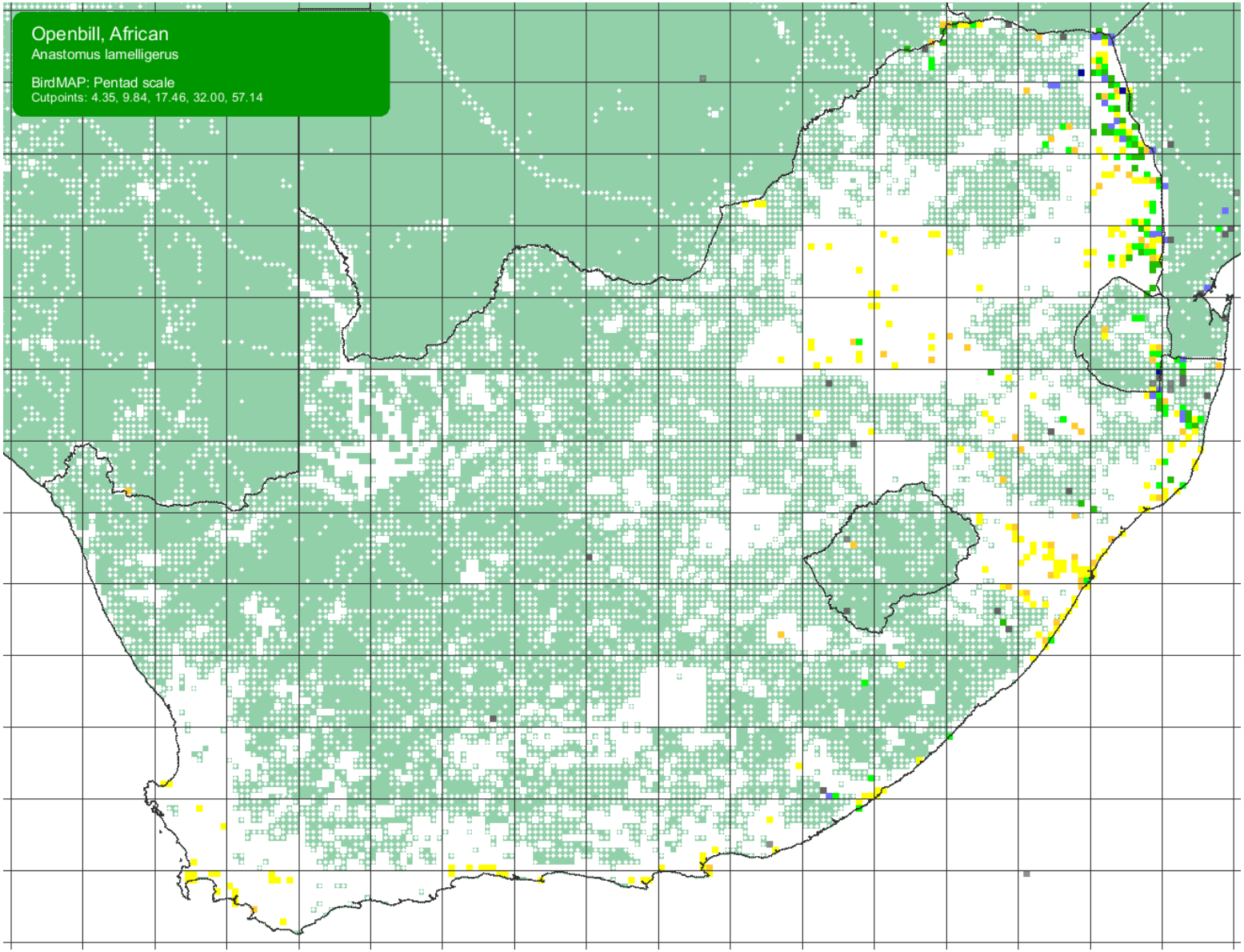

Figure 7. SABAP2 distribution map for the African Openbill, downloaded 4 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–4.3%, orange 4.3–9.8%, light green 9.8–17.5%, dark green 17.5–32.0%, light blue 32.0–57.1% and dark blue 57.1–100%.

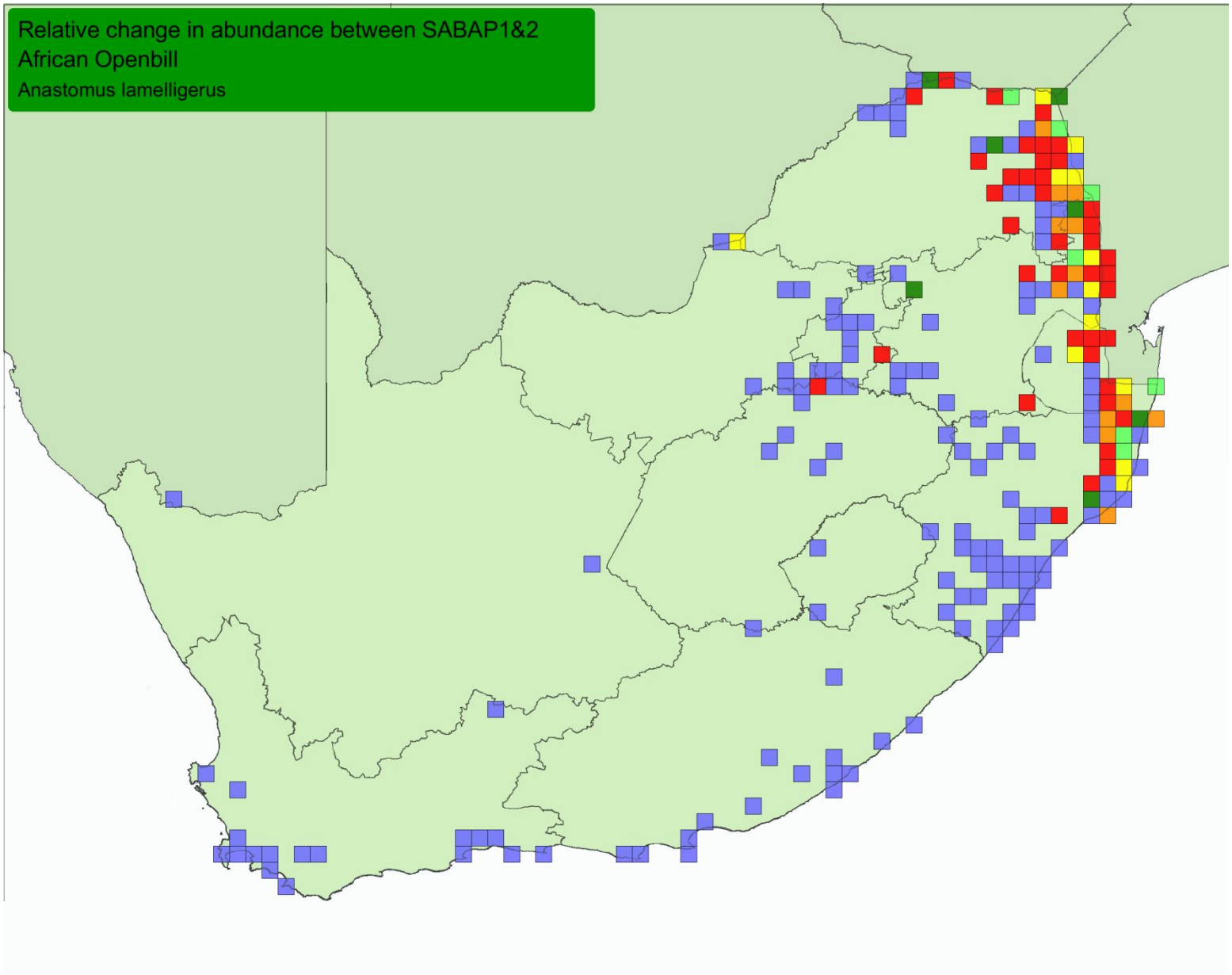

Figure 8. Range-change map between SABAP1 and SABAP2 for the African Openbill, downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 2. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 2. Range-change summary for the African Openbill Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 8, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	4+ checklist for SABAP1 and SABAP2		30+ checklist for SABAP1 and SABAP2	
	Count	%	Count	%
Red (very large decrease)	40	18	28	17
Orange (large decrease)	12	6	11	7
Yellow (small decrease)	12	6	10	6
Light green (small increase)	7	3	6	4
Dark green (large increase)	7	3	6	4
Blue (very large increase)	139	64	108	64
Total	217	100	169	100

Figure 9. Saddle-billed Stork, Tshipise, Limpopo. Photographer © John H Wilkinson. Record 1112 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-1112

Saddle-billed Stork *Ephippiorhynchus senegalensis*

The Saddle-billed Stork (Figure 9) was largely confined to the large protected areas, the Kruger National Park and the parks of northern KwaZulu-Natal during SABAP1, with isolated records farther south and west (Figure 10). The SABAP2 distribution follows this same pattern (Figure 11). However, it appears to have shown very large decreases in about 50% of its grid cells (Figure 12, Table 3).

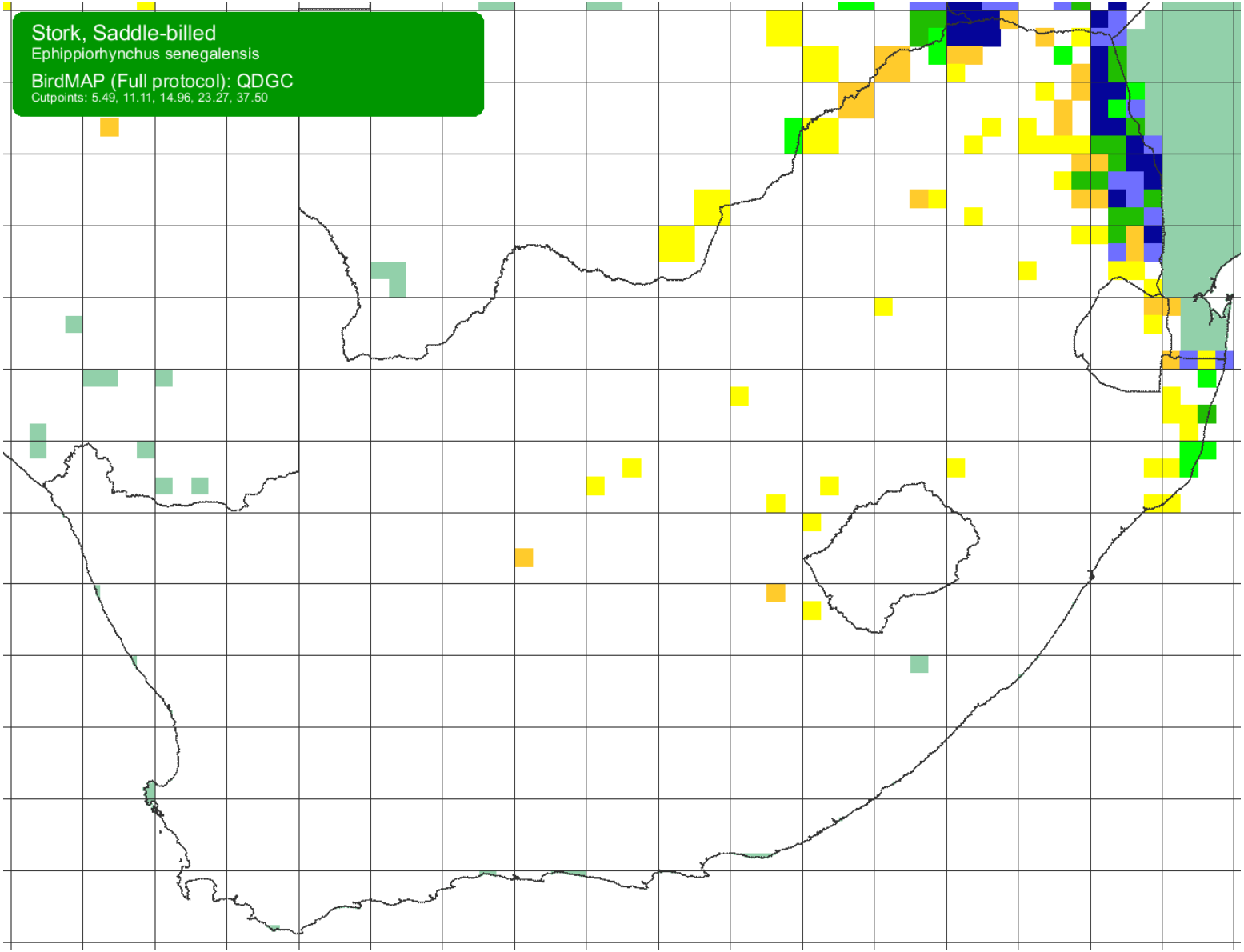

Figure 10. SABAP1 distribution map for the Saddle-billed Stork. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 11.

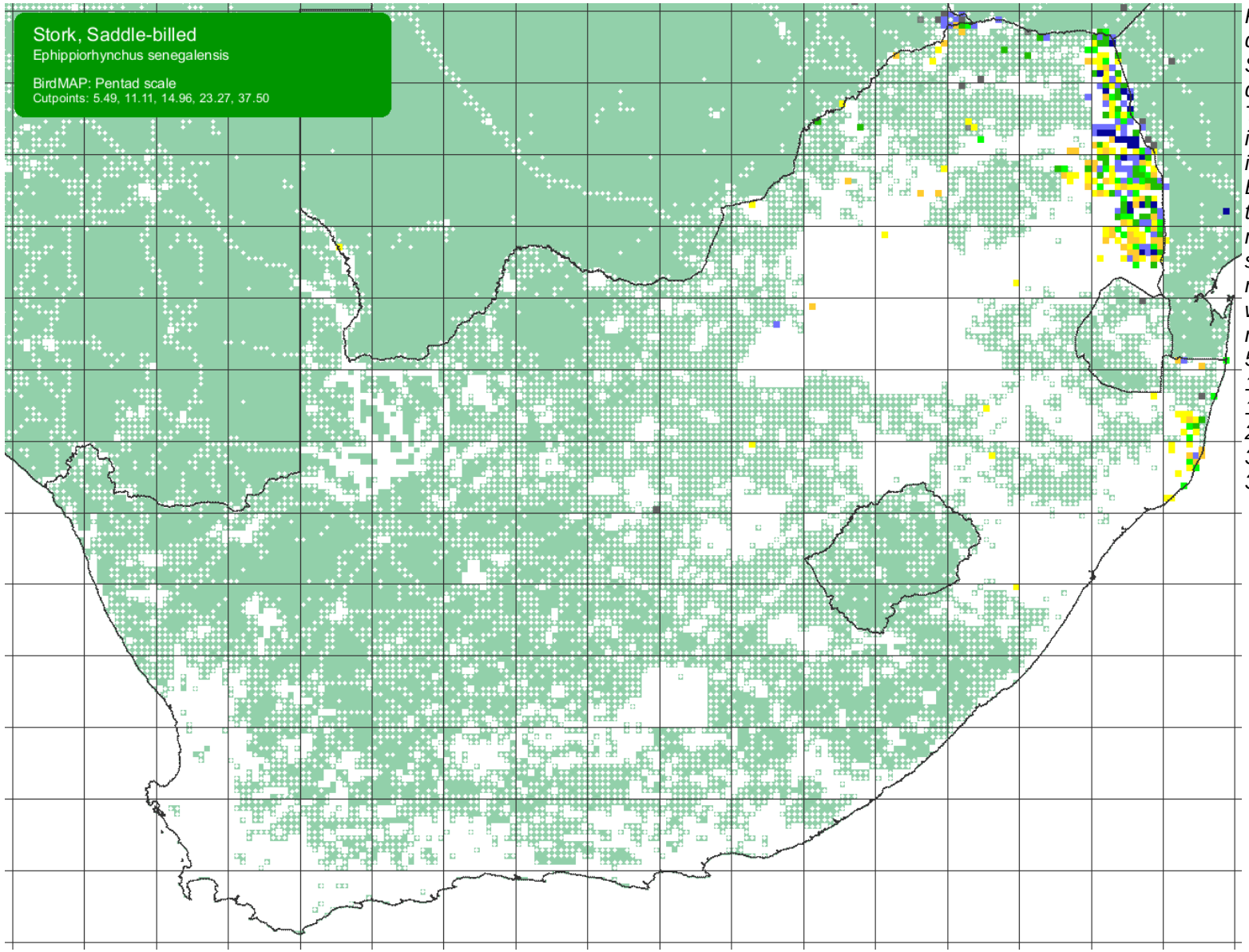

Figure 11. SABAP2 distribution map for the Saddle-billed Stork, downloaded 4 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–5.5%, orange 5.5—11.1%, light green 11.1–15.0%, dark green 15.0–23.3%, light blue 23.3–37.5% and dark blue 37.5–100%.

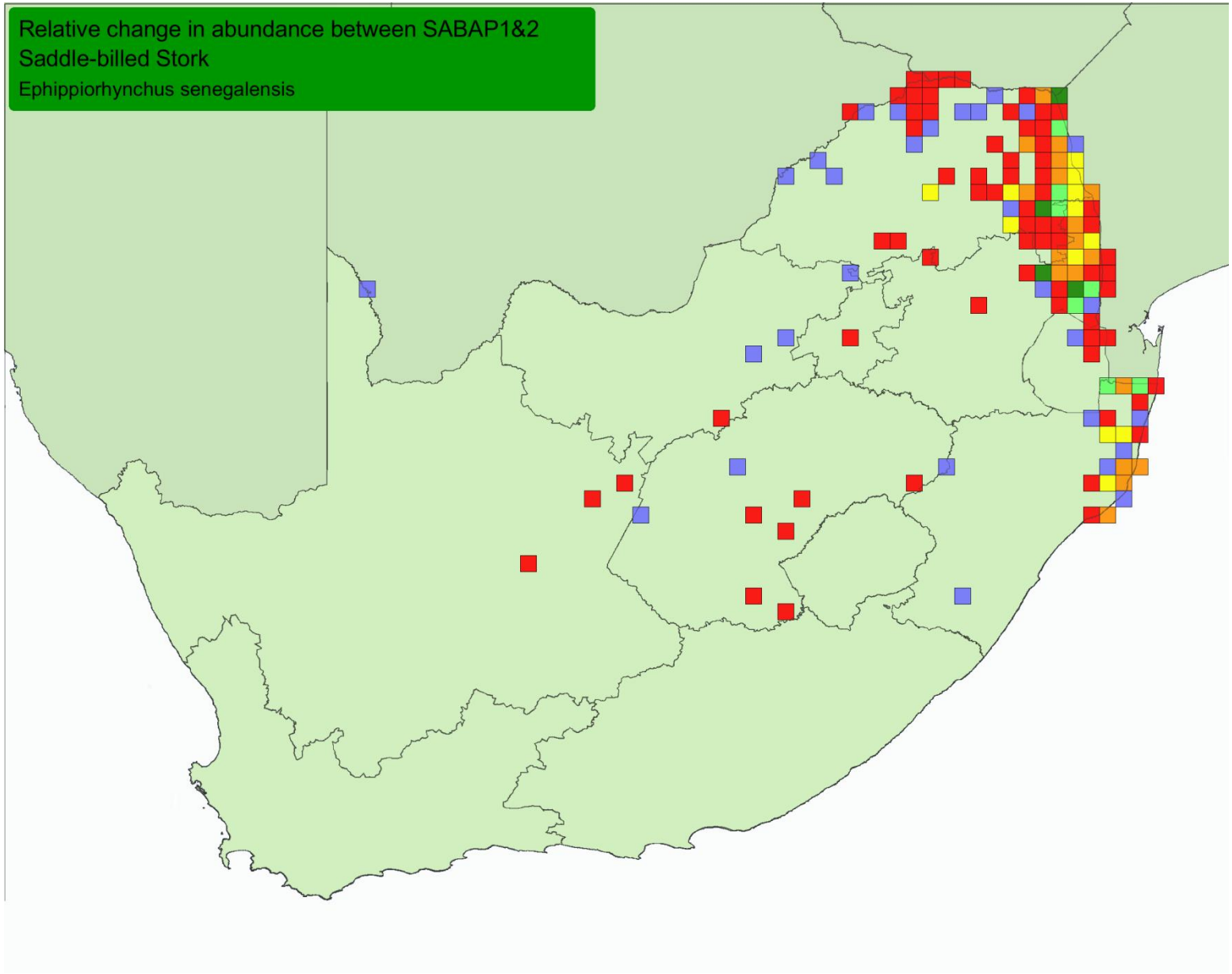

Figure 12. Range-change map between SABAP1 and SABAP2 for the Saddle-billed Stork. downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 3. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 3. Range-change summary for the Saddle-billed Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 12, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	4+ checklist for SABAP1 and SABAP2		30+ checklist for SABAP1 and SABAP2	
	Count	%	Count	%
Red (very large decrease)	69	50	42	46
Orange (large decrease)	18	13	16	17
Yellow (small decrease)	12	9	10	11
Light green (small increase)	7	5	7	8
Dark green (large increase)	4	3	4	4
Blue (very large increase)	29	21	13	14
Total	139	100	92	100

Figure 13. Yellow-billed Stork, Mapungubwe, Limpopo. Photographer © Lia Steen. Record 1030 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-1030

Yellow-billed Stork *Mycteria ibis*

During SABAP1, the Yellow-billed Stork (Figure 13) was recorded at scattered localities, invariably wetlands, across the more mesic eastern half of the atlas region (Figure 14). The overall pattern of distribution for SABAP2 is similar, with a striking concentration on the Vaal Dam which was not in evidence during SABAP1 (Figures 14 and 15). Overall, there appear to be far more grid cells in which the species has decreased rather than increased (Figure 16, Table4)

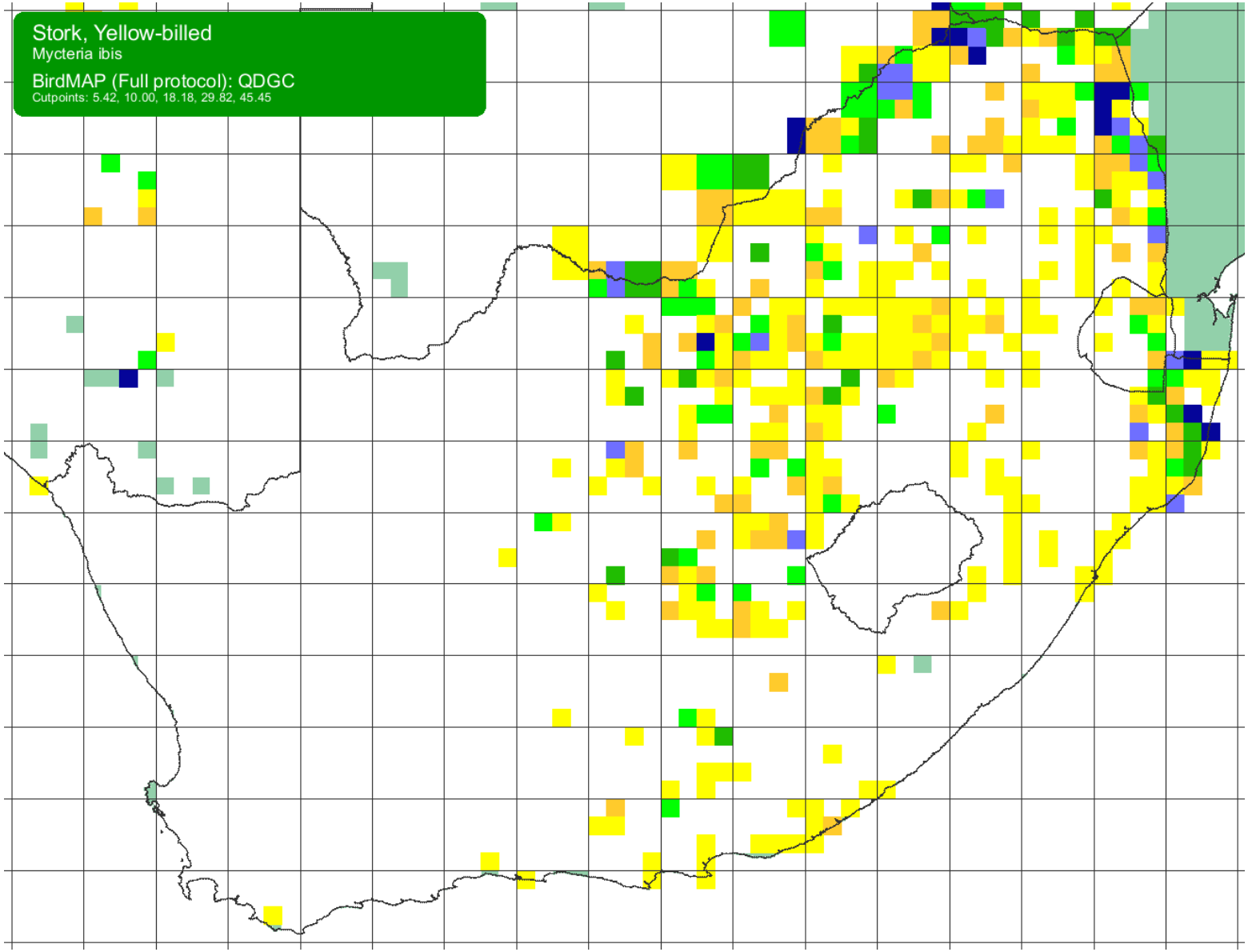

Figure 14. SABAP1 distribution map for the Yellow-billed Stork. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 15.

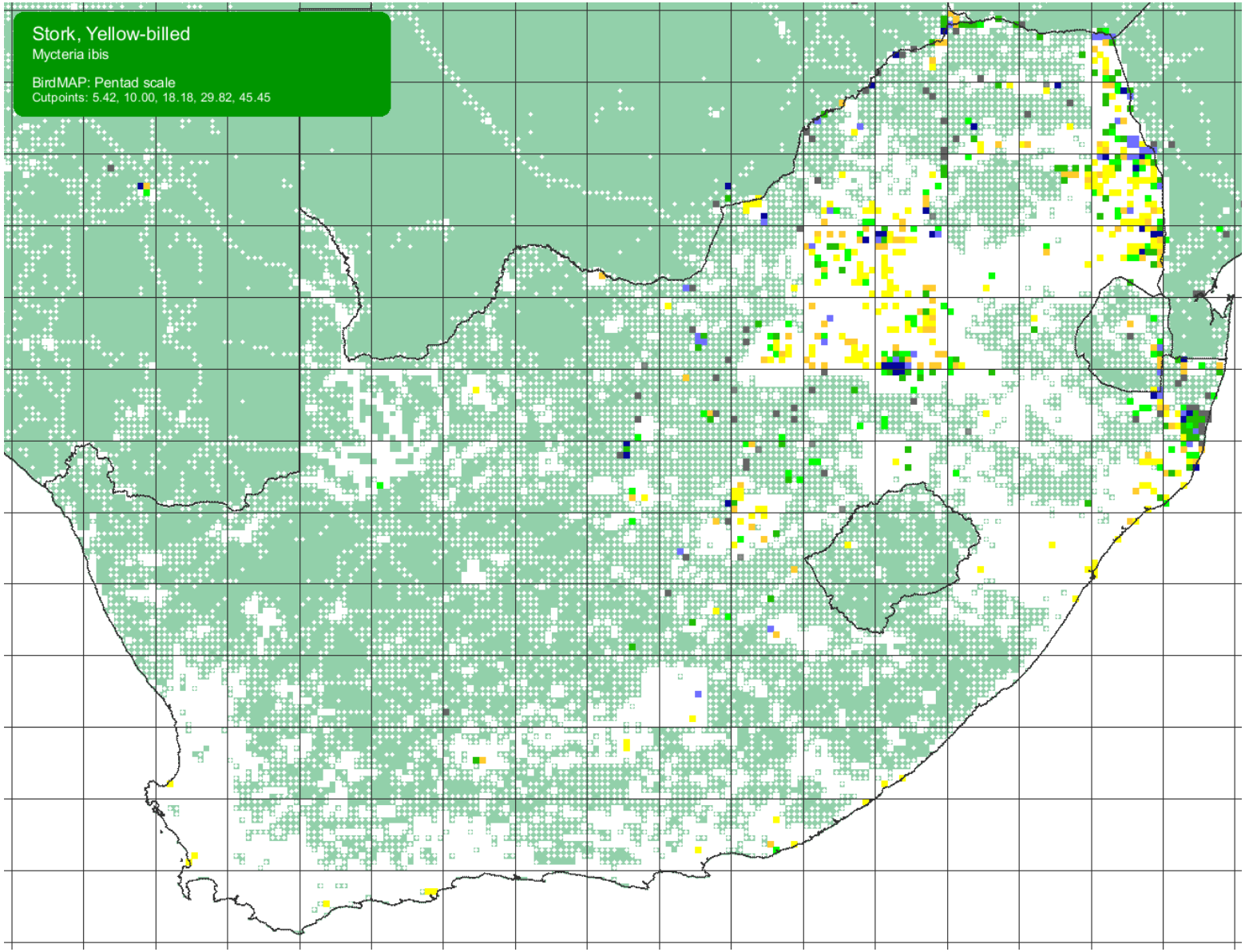

Figure 15. SABAP2 distribution map for the Yellow-billed Stork, downloaded 11 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–5.4%, orange 5.4–10%, light green 10–18.2%, dark green 18.2–29.8%, light blue 29.8–45.5% and dark blue 45.5–100%.

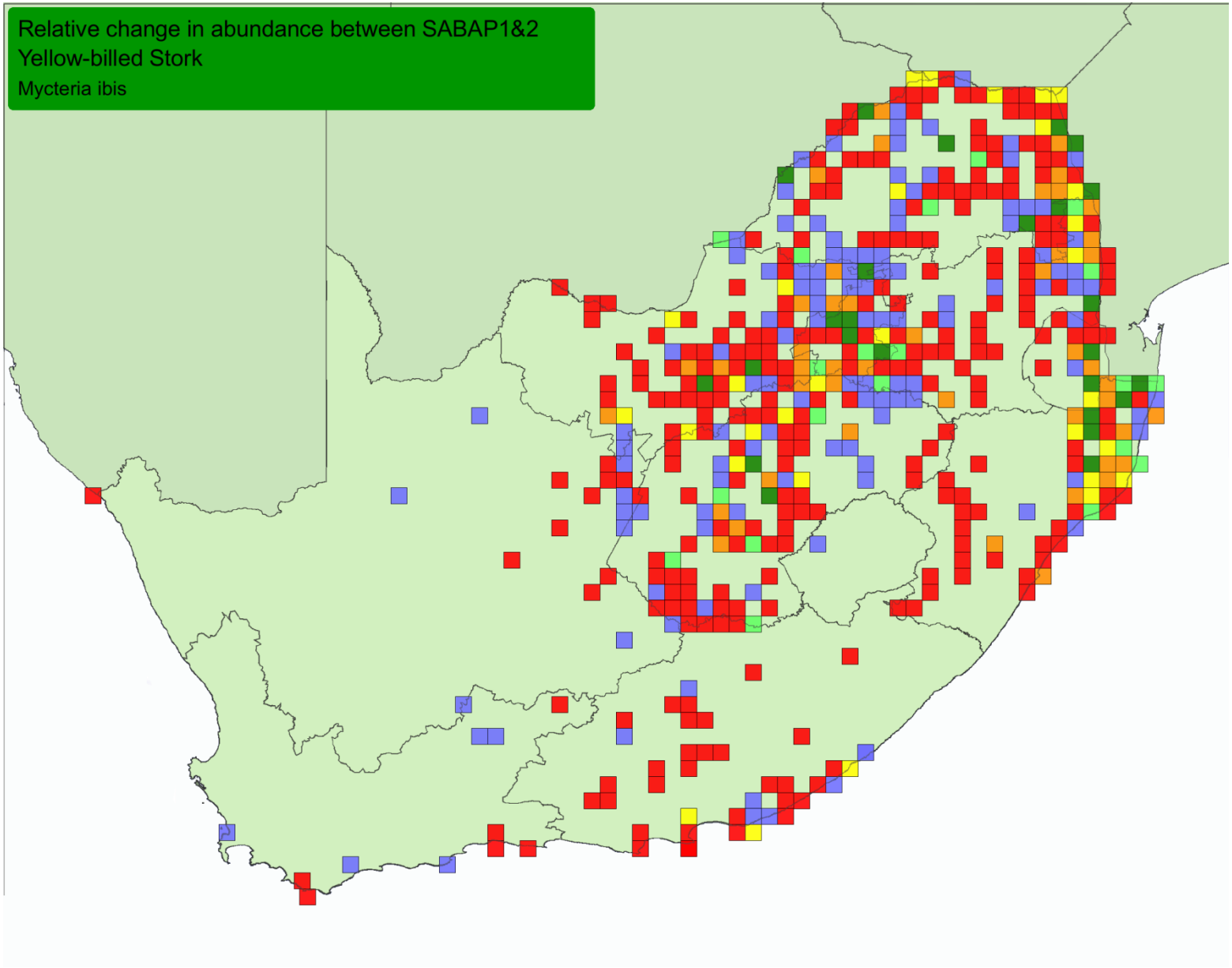

Figure 16. Range-change map between SABAP1 and SABAP2 for the Yellow-billed Stork. downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 4. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 4. Range-change summary for the Yellow-billed Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 16, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	4+ checklist for SABAP1 and SABAP2		30+ checklist for SABAP1 and SABAP2	
	Count	%	Count	%
Red (very large decrease)	273	53	146	49
Orange (large decrease)	45	9	36	12
Yellow (small decrease)	30	6	21	7
Light green (small increase)	20	4	16	5
Dark green (large increase)	25	5	20	7
Blue (very large increase)	120	23	61	20
Total	513	100	300	100

Woolly-necked Stork *Ciconia episcopus*

The Woolly-necked Stork (Figure 17) was largely confined to the Kruger National Park, eastern Swaziland and coastal KwaZulu-Natal as far south as about Durban during SABAP1 (Figure 18). It has subsequently expanded its range along the coast to the south and to some extent into the KwaZulu-Natal midlands, Figure 19 now shows that the core of its range within the SABAP2 region now lies farther south than it did during SABAP1. One sixth of pentads have reporting rates exceeding 45%. The extent of the increase in abundance is clear in Figure 20 and Table 5.

Figure 17. Woolly-necked Stork, St Lucia, KwaZulu-Natal. Photographer © Gregg Darling, Des Darling. Record 8762 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-8762

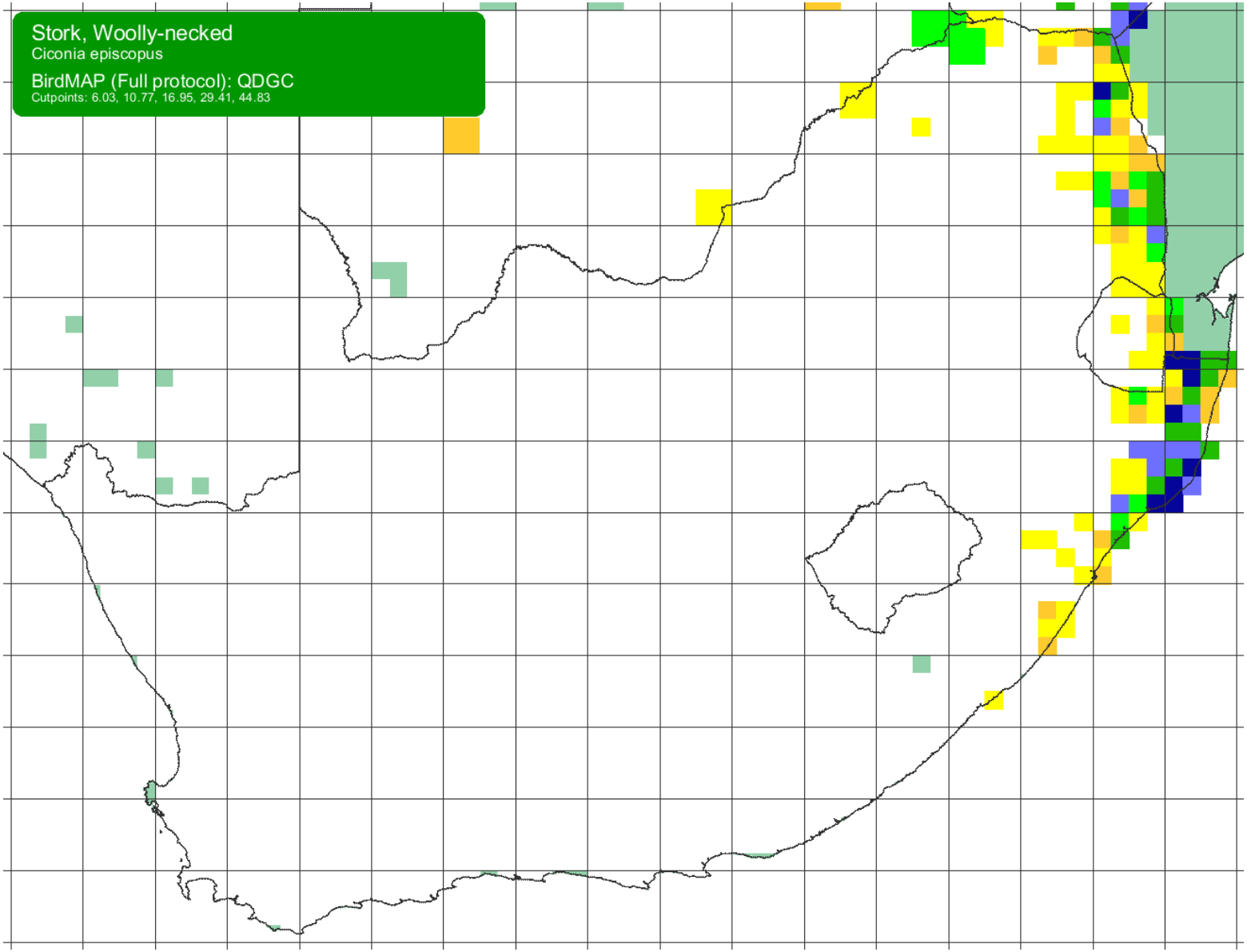

Figure 18. SABAP1 distribution map for the Woolly-necked Stork. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 19.

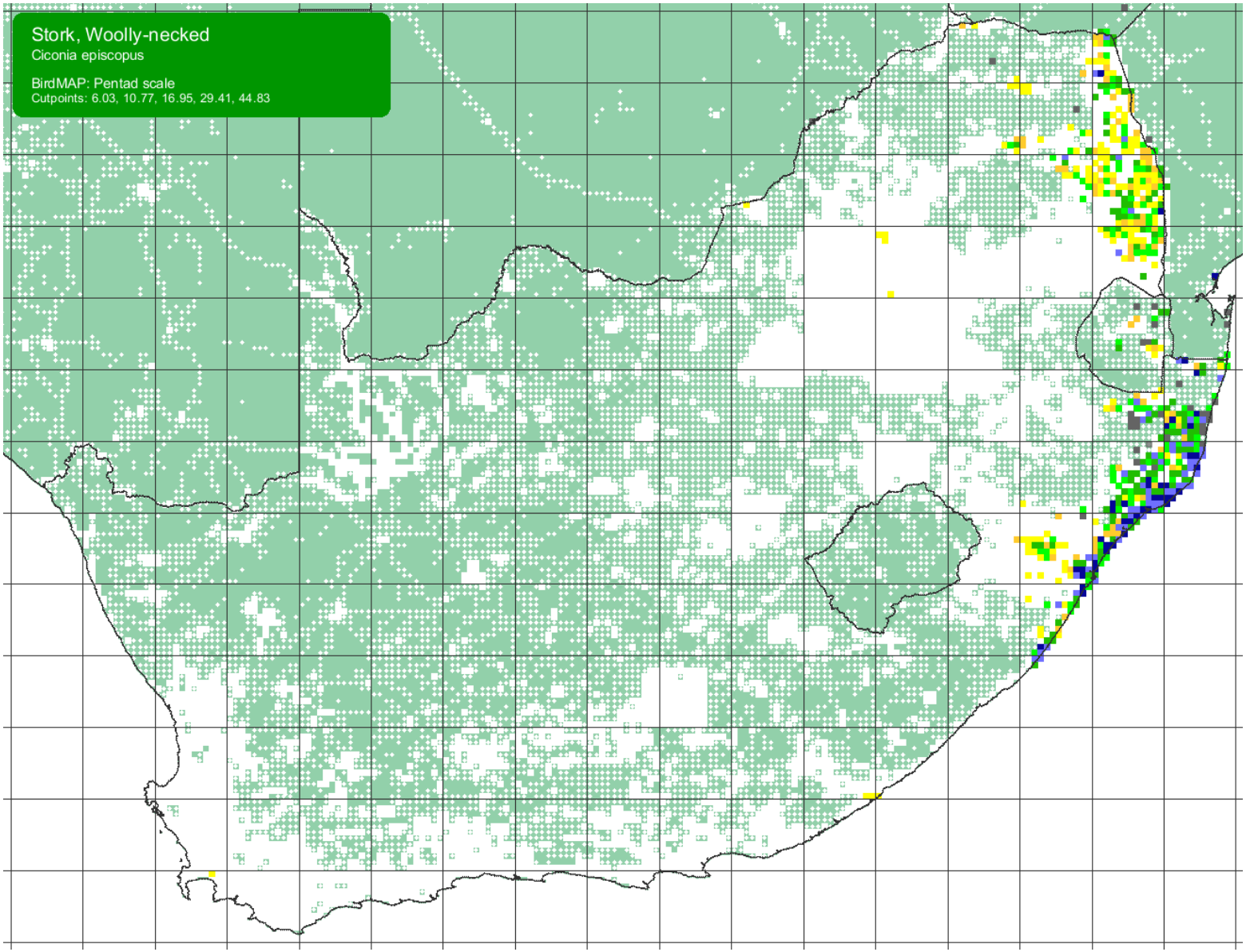

Figure 19. SABAP2 distribution map for the Woolly-necked Stork, down-loaded 11 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–6.0%, orange 6.0–10.8%, light green 10.8–17.0%, dark green 17.0–29.4%, light blue 29.4–44.8% and dark blue 44.8–100%.

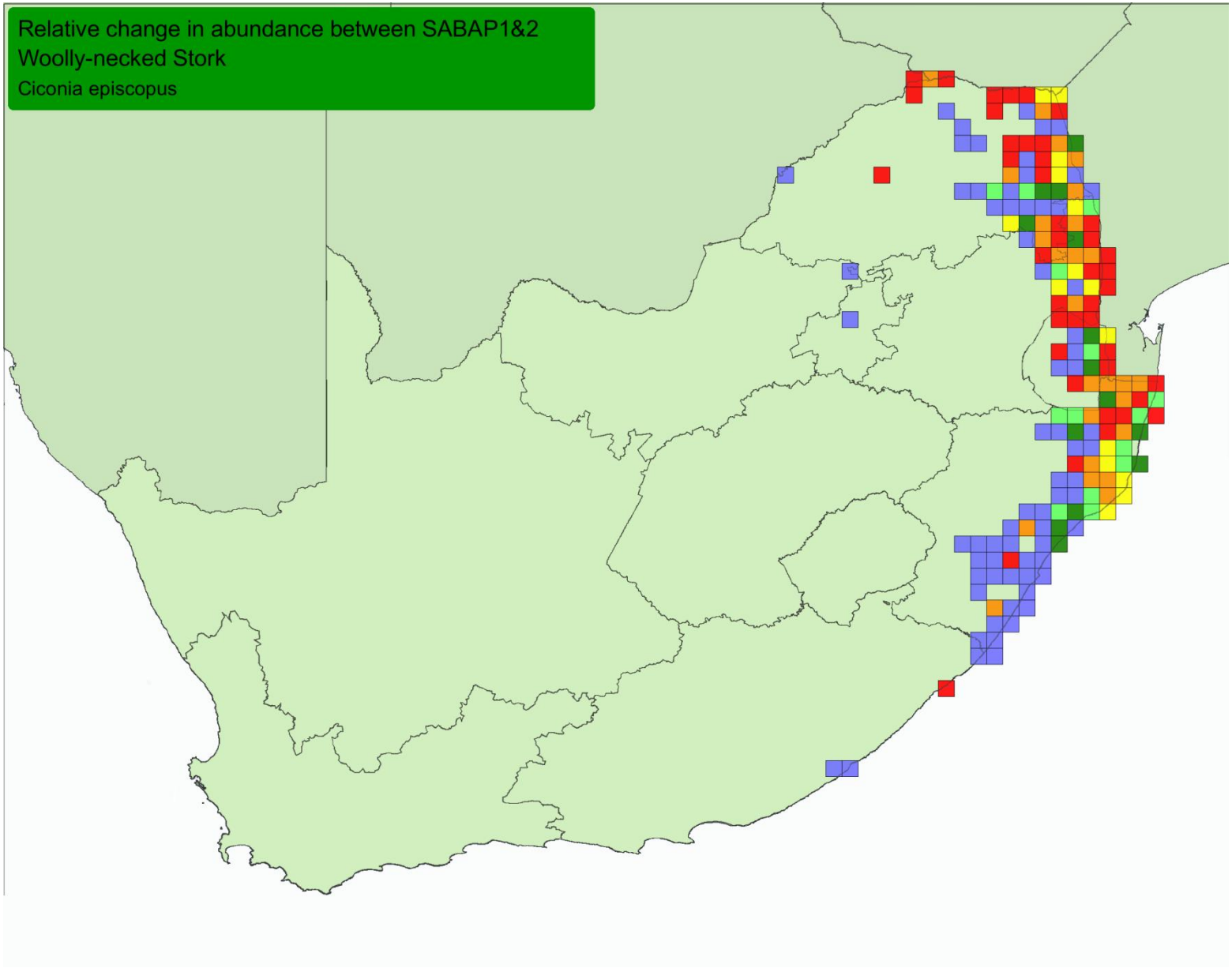

Figure 20. Range-change map between SABAP1 and SABAP2 for the Woolly-necked Stork, downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 5. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 5. Range-change summary for the Woolly-necked Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 20, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	4+ checklist for SABAP1 and SABAP2		30+ checklist for SABAP1 and SABAP2	
	Count	%	Count	%
Red (very large decrease)	42	23	20	15
Orange (large decrease)	26	14	24	18
Yellow (small decrease)	15	8	12	9
Light green (small increase)	14	8	11	8
Dark green (large increase)	14	8	12	9
Blue (very large increase)	69	38	52	40
Total	180	100	131	100

Figure 21. Abdim's Stork, Airpark, Eastern Cape. Photographer © Gregg Darling and Clive Wright. Record 2462 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-2462

Abdim's Stork *Ciconia abdimii*

Abdim's Stork (Figure 21) is an intra-African migrant from West Africa to southern Africa. It is one of the storks associated with terrestrial habitats, rather than wetlands, and it is frequently recorded in agricultural landscapes. It seems to have collapsed in distribution between SABAP1 (Figure 22) and SABAP2 (Figure 23). The range-change map for the species (Figure 24) and the results presented in Table 6 suggest that, between SABAP1 and SABAP2, there have been very large decreases in about two-thirds of the grid cells in which it has occurred. Abdim's Stork is certainly a species in severe Trouble. The underlying causes of the problem more like to lie in its West African breeding grounds rather than in southern Africa, where the agricultural habitats in which it mainly occurs are unlikely to have changed much.

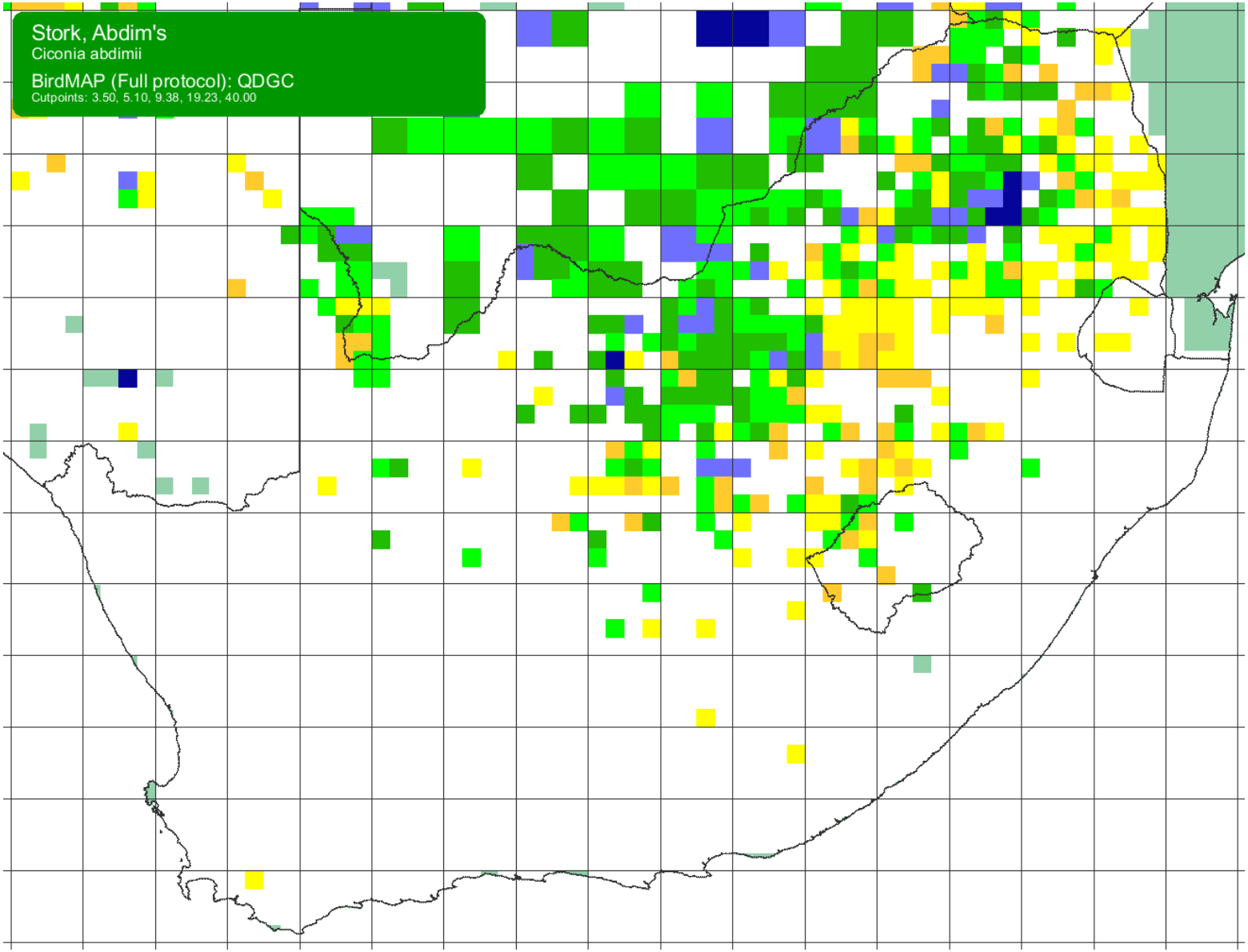

Figure 22. SABAP1 distribution map for the Abdim's Stork. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 23.

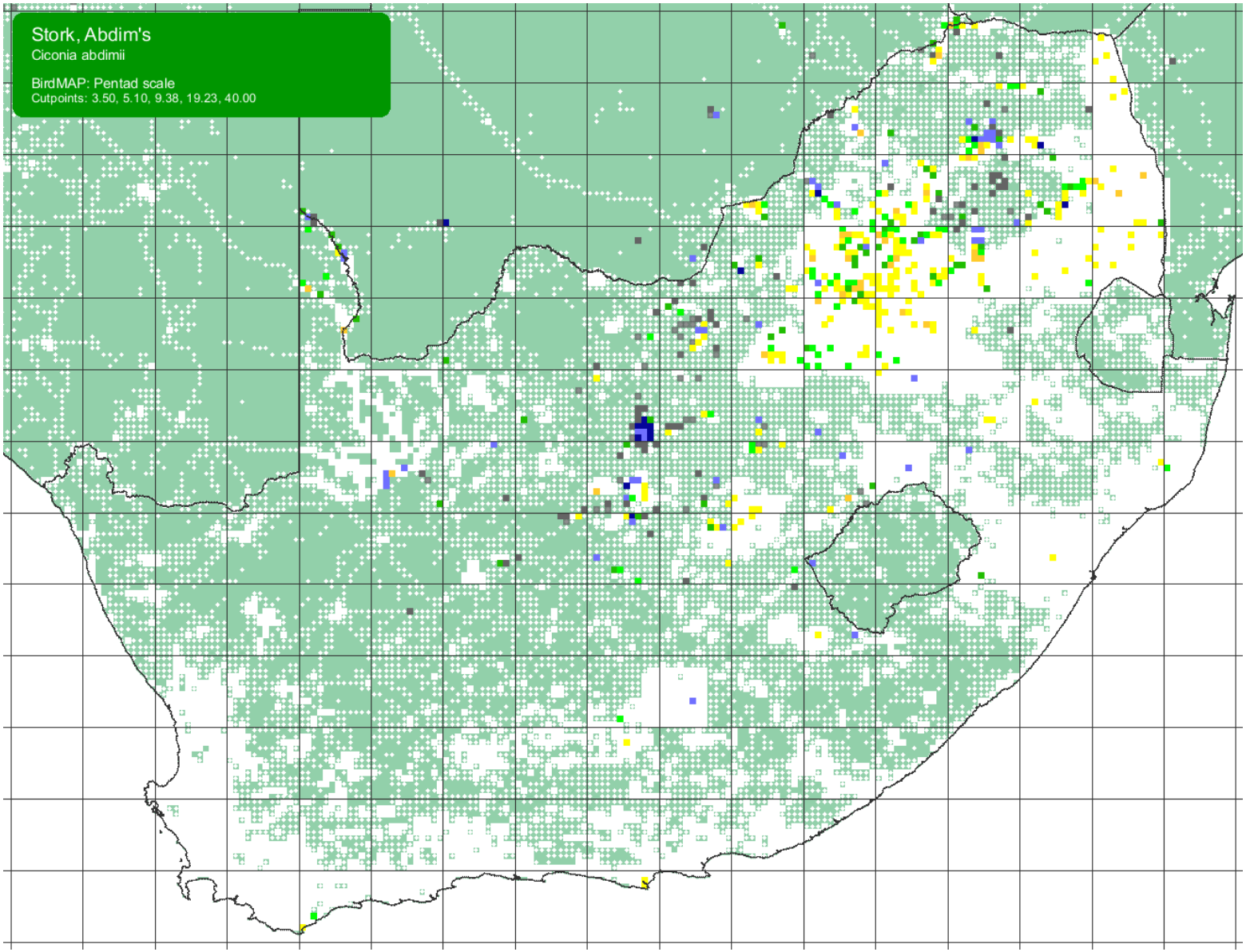

Figure 23. SABAP2 distribution map for the Abdim's Stork, downloaded 4 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–3.5%, orange 3.5–5.1%, light green 5.1–9.3%, dark green 9.3–19.2%, light blue 19.2–40.0% and dark blue 40.0–100%.

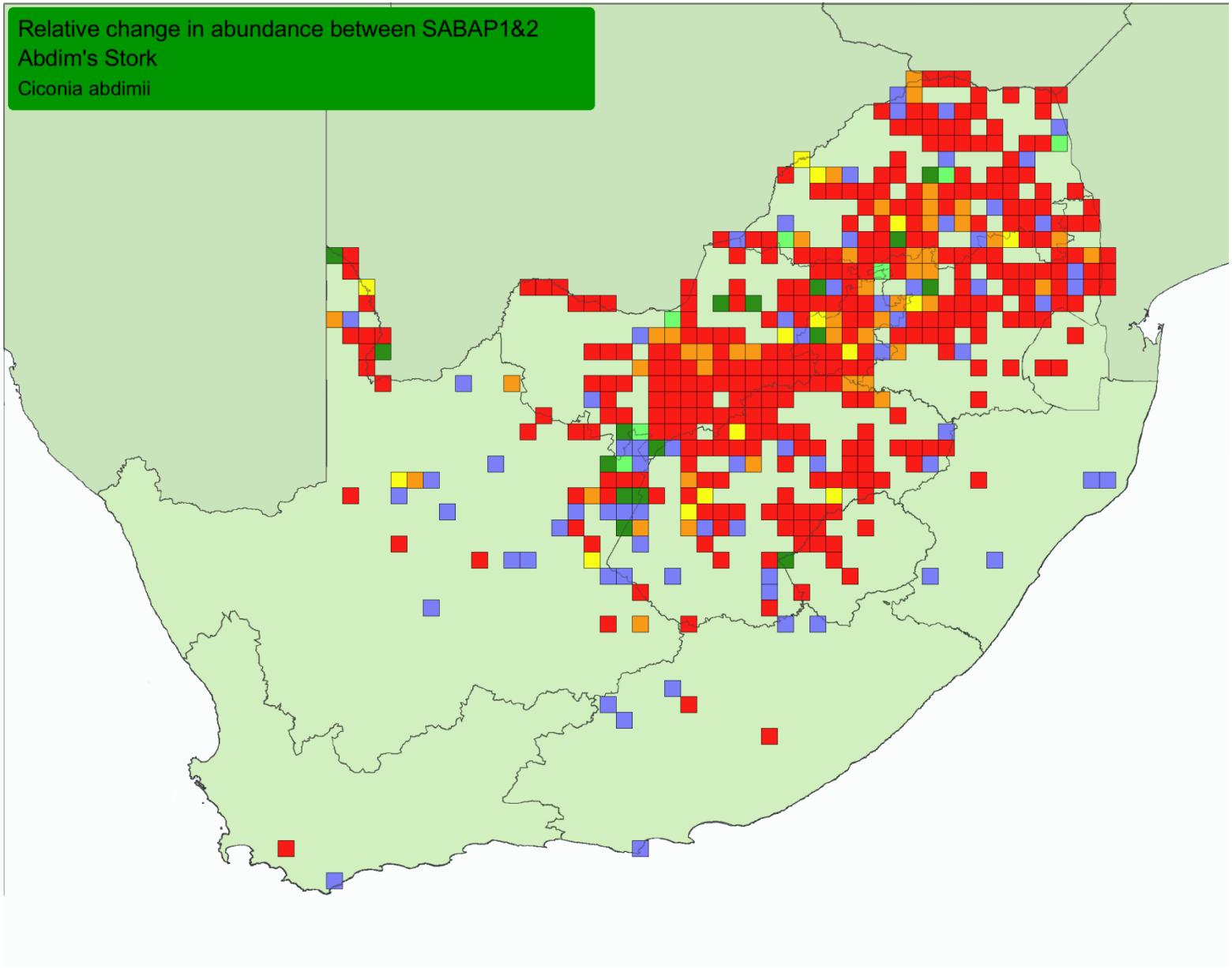

Figure 24. Range-change map between SABAP1 and SABAP2 for the Abdim's Stork. downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 6. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 6. Range-change summary for the Abdim's Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 24, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	4+ checklist for SABAP1 and SABAP2		30+ checklist for SABAP1 and SABAP2	
	Count	%	Count	%
Red (very large decrease)	317	67	162	69
Orange (large decrease)	47	10	26	11
Yellow (small decrease)	15	3	8	3
Light green (small increase)	7	1	2	1
Dark green (large increase)	16	3	7	3
Blue (very large increase)	70	15	30	13
Total	472	100	235	100

Black Stork *Ciconia nigra*

The resident population of Black Storks (Figure 25) that breeds over much of Africa south of the equator is geographical isolated from the migrant population that occurs in the Sahel Zone of West Africa, south of the Sahara Desert.

Figure 25. Black Stork, Moshatu Game Reserve, Botswana. Photographer © Derek Solomon. Record 5911 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-5911

The Black Stork was a widespread species across the atlas region during SABAP1 (Figure 26). A quarter-century later, it has the same overall range, but has become scattered within it (Figure 27). Figure 28 and Table 7 highlight the enormity of the decrease, with very large decreases in two-thirds of this species's grid cells.

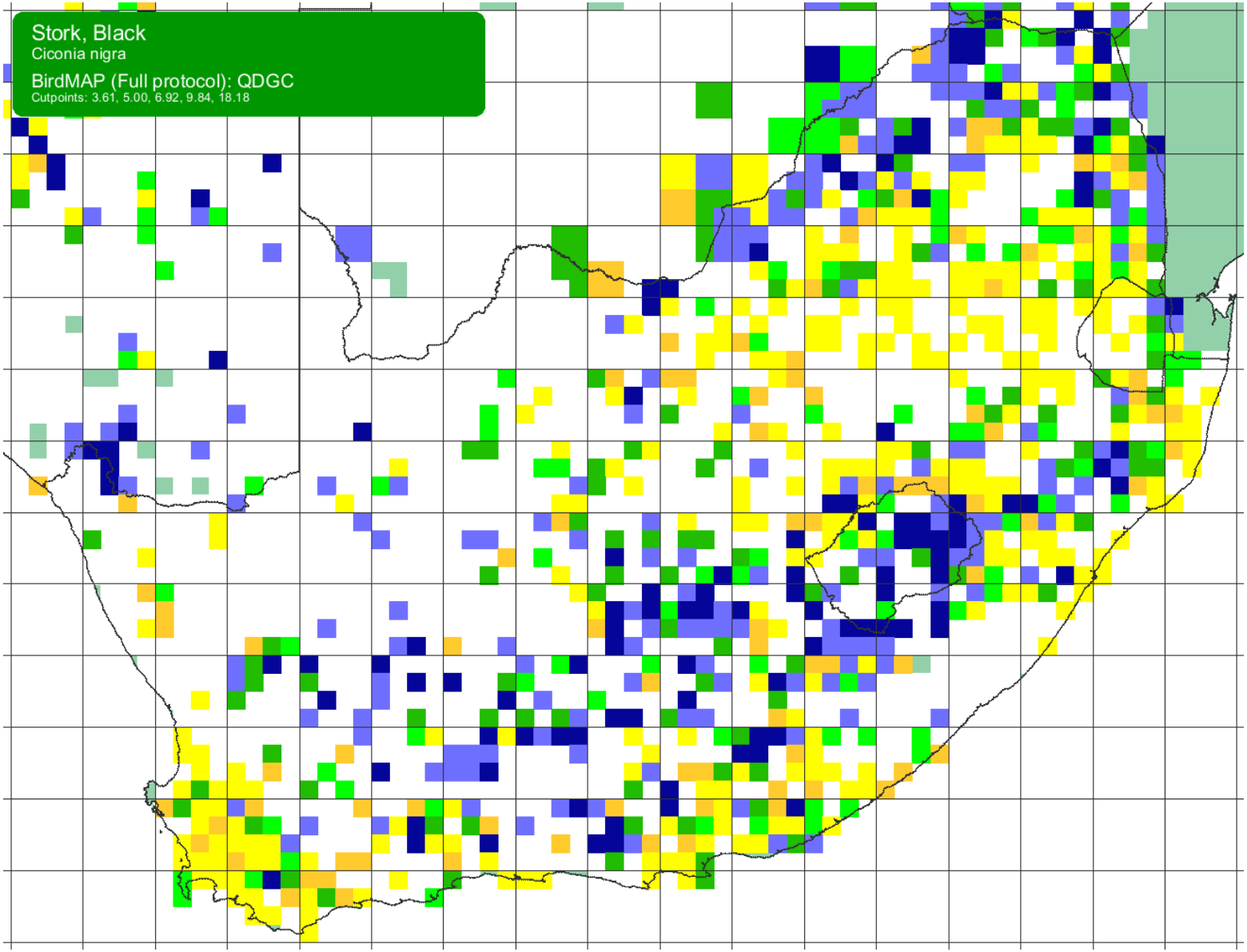

Figure 26. SABAP1 distribution map for the Black Stork. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 24.

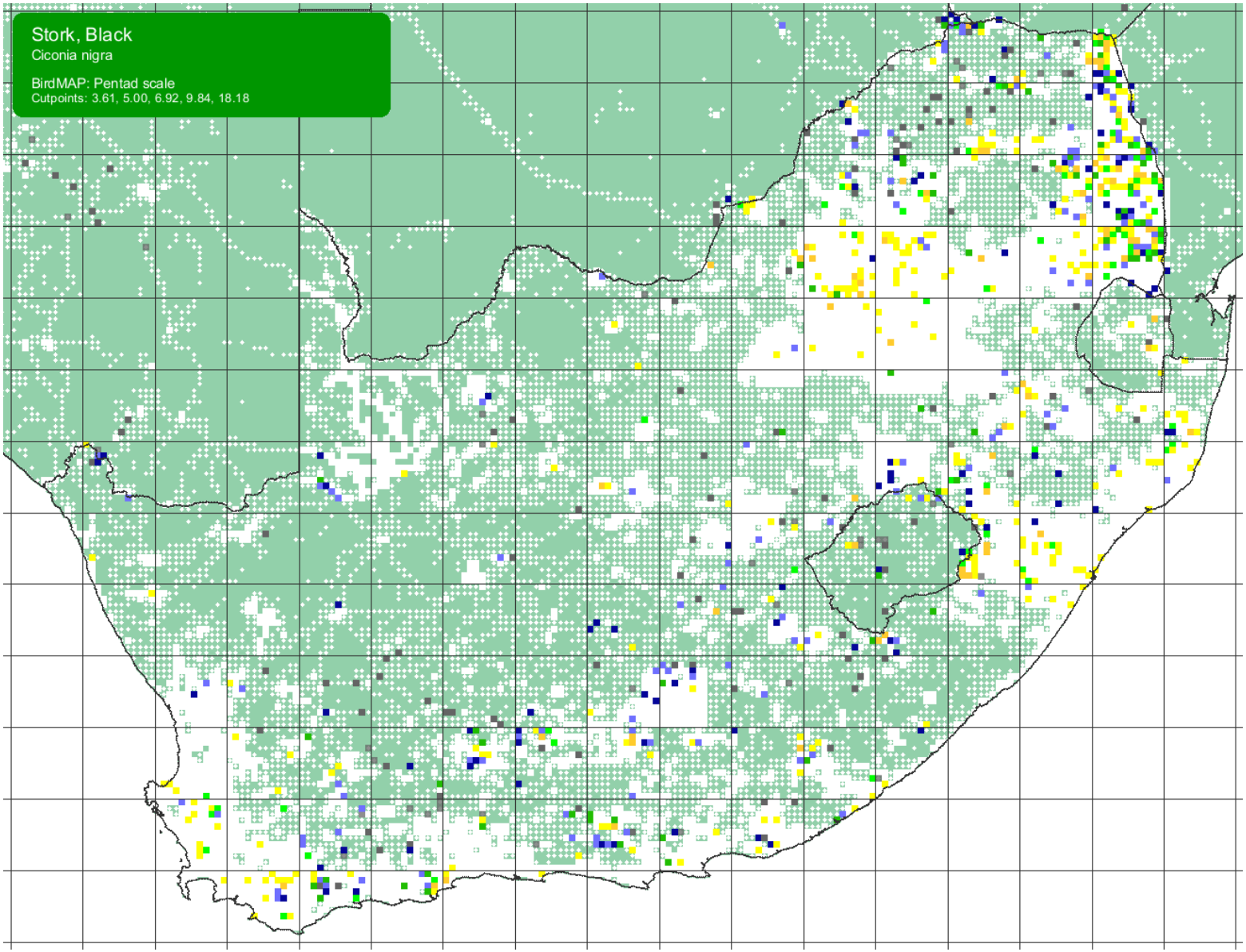

Figure 27. SABAP2 distribution map for the Black Stork, downloaded 4 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–3.6%, orange 3.6–5.0%, light green 5.0–6.9%, dark green 6.9–9.8%, light blue 9.8–18.2% and dark blue 18.2–100%.

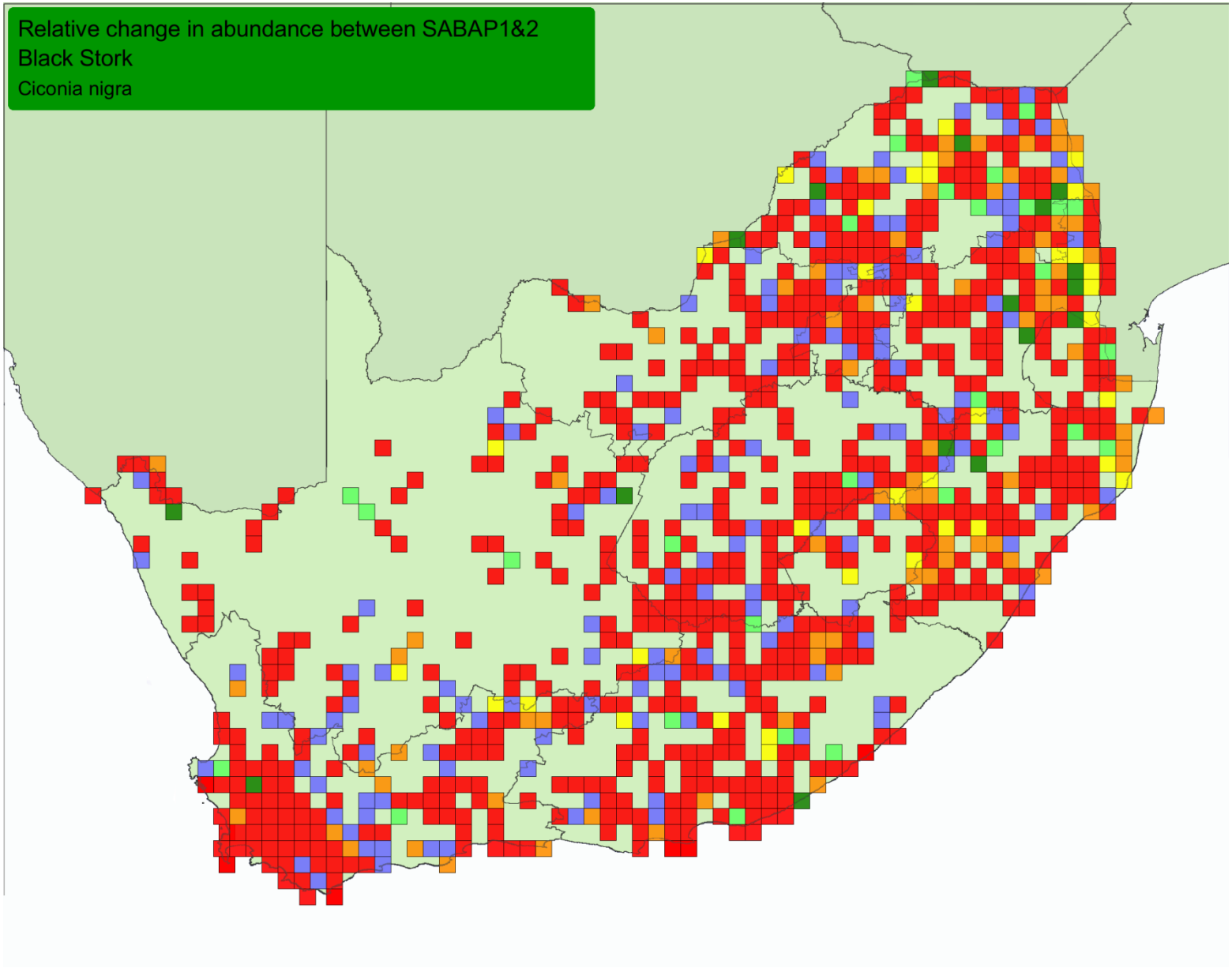

Figure 28. Range-change map between SABAP1 and SABAP2 for the Black Stork. downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 7. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 7. Range-change summary for the Black Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 28, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	4+ checklist for SABAP1 and SABAP2		30+ checklist for SABAP1 and SABAP2	
	Count	%	Count	%
Red (very large decrease)	639	68	320	66
Orange (large decrease)	84	9	62	13
Yellow (small decrease)	36	4	20	4
Light green (small increase)	29	3	21	4
Dark green (large increase)	17	2	13	3
Blue (very large increase)	135	14	49	10
Total	940	100	485	100

Figure 29. White Stork, Thornville, KwaZulu-Natal. Photographer © Malcolm Robinson. Record 1470 in the BirdPix section of the ADU Virtual Museum. Full details at http://vmus.adu.org.za/?vm=BirdPix-1470

White Stork *Ciconia cicnonia*

The White Stork (Figure 29) is a migrant from Eurasia, with a miniscule breeding population in the Western Cape. It was widely distributed across the moister eastern and southern sections of the study region during both SABAP1 (Figure 30) and SABAP2 (Figure 31). However, there is almost certainly a decrease in relative abundance between the two projects (Figure 32). Half of the quarter degree grid cells in which White Storks have been record are estimated to show very large decreases in relative abundance (Table 8).

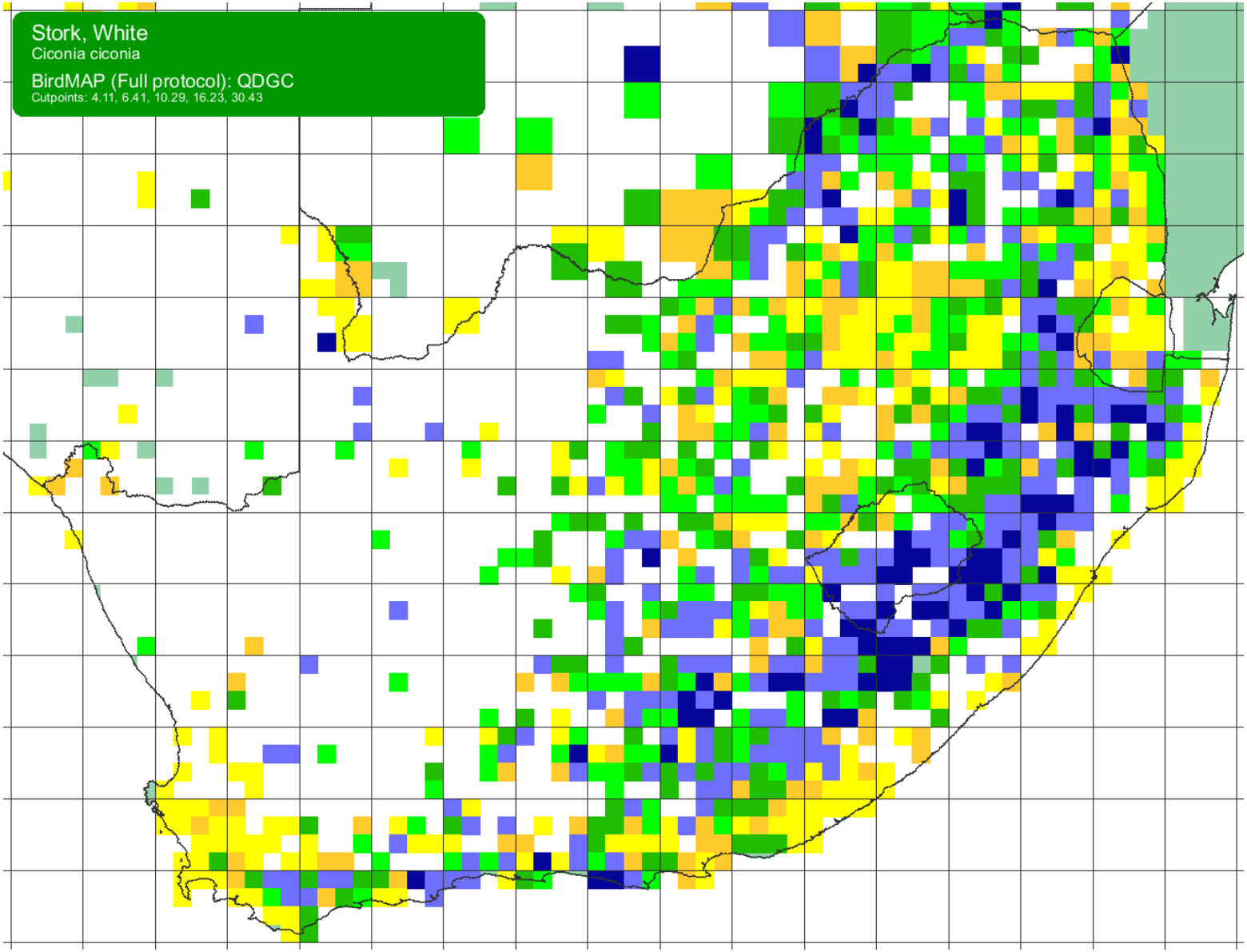

Figure 30. SABAP1 distribution map for the White Stork. Note that quarter degree grid cells shaded turquoise had no SABAP1 data (Mozambique, Botswana, Namibia and one in the former Transkei). The colours represent reporting rates, and the cutpoints for the different colours are the same as used for SABAP2, see Figure 30.

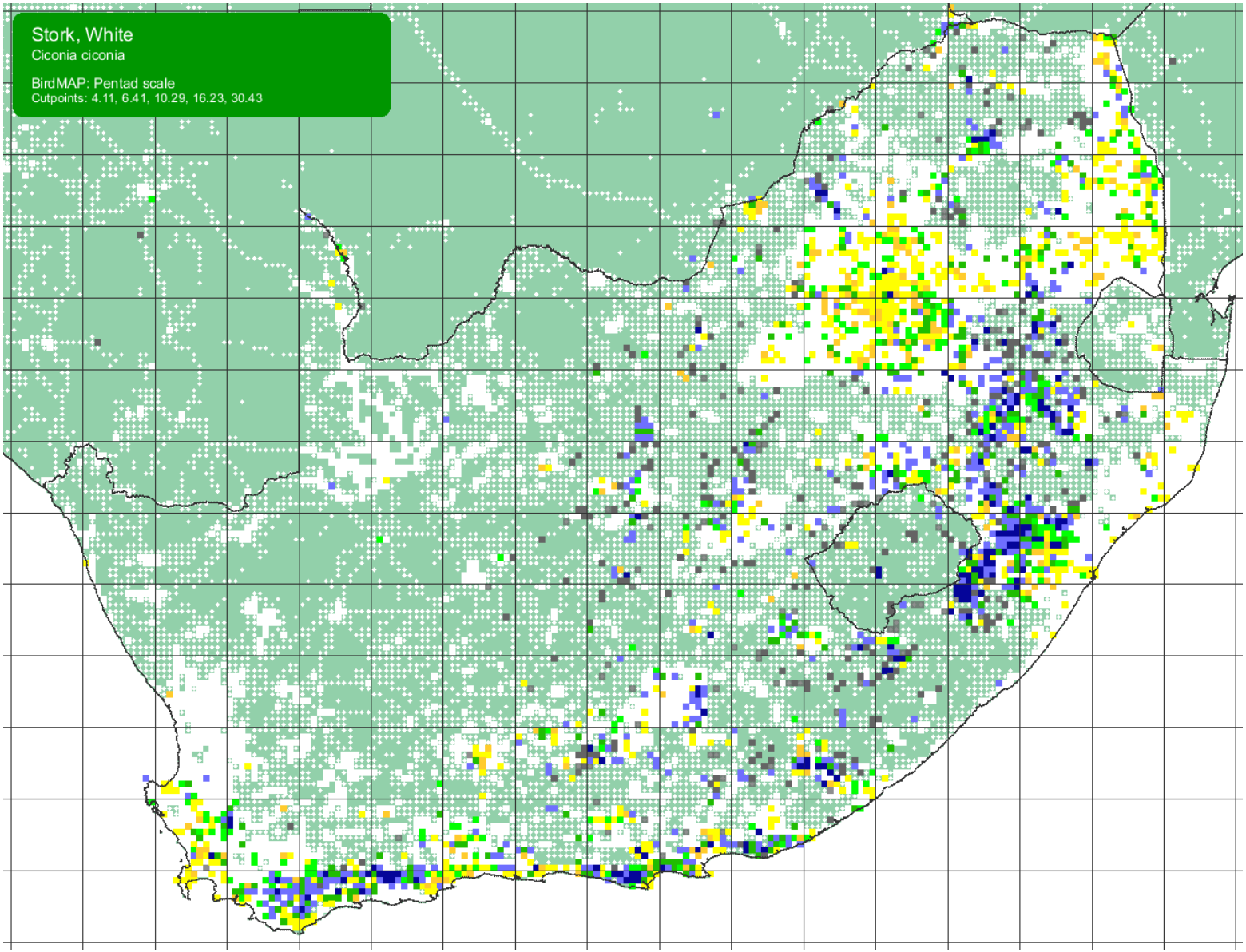

Figure 31. SABAP2 distribution map for the White Stork, downloaded 11 April 2017. The detailed interpretation of this map is provided by Underhill & Brooks (2016a) and see text. Pentads with four or more checklists are either shaded white, species not recorded, or in colour, with shades based on reporting rate: yellow 0–4.1%, orange 4.1–6.4%, light green 6.4–10.3%, dark green 10.3–16.2%, light blue 16.2–30.4% and dark blue 30.4–100%.

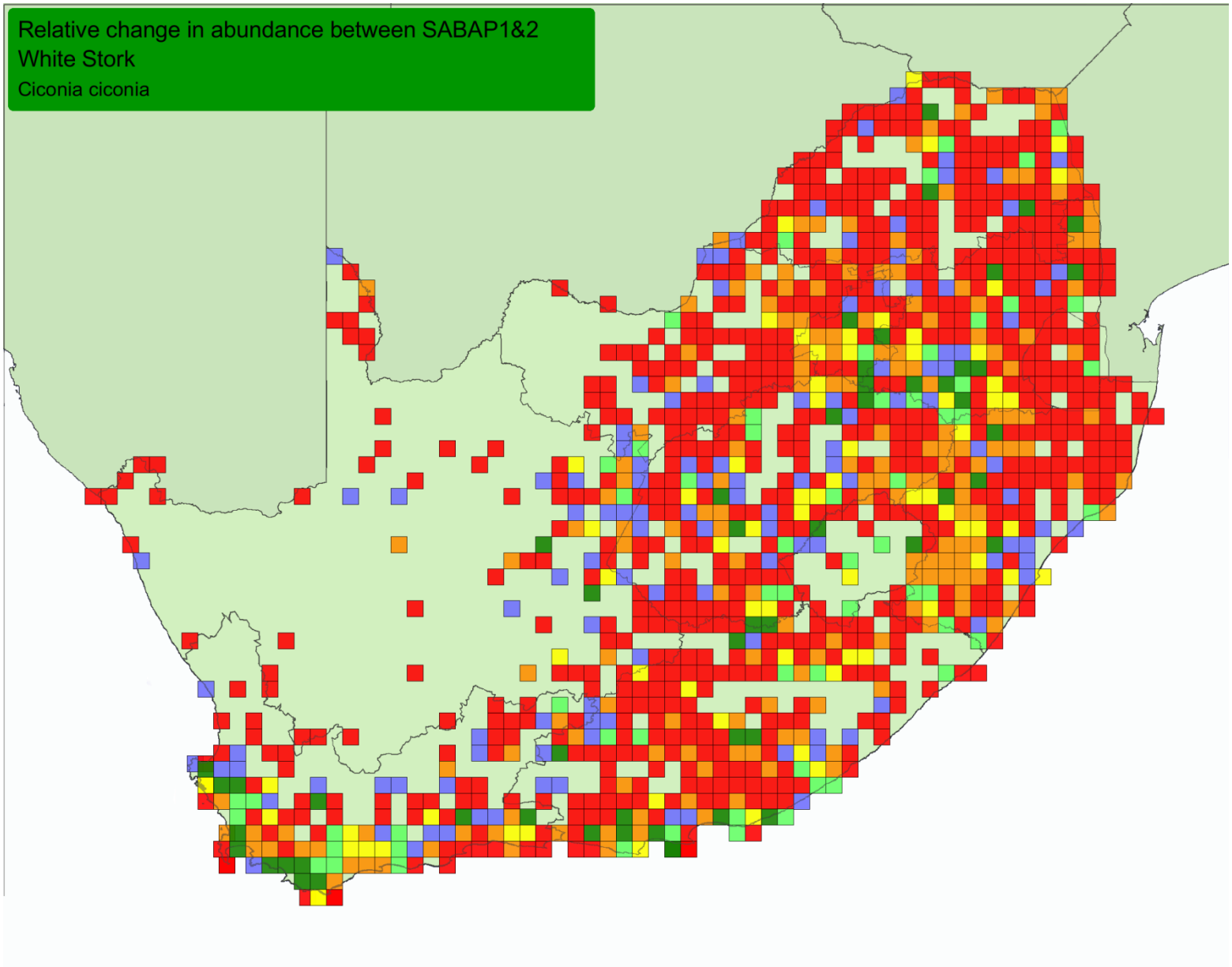

Figure 32. Range-change map between SABAP1 and SABAP2 for the White Stork. downloaded 11 April 2017. Red, orange and yellow represent quarter-degree grid cells with very large, large, and small relative decreases and blue, dark green and light green represent grid cells with very large, large and small relative increases. A count of the number of grid cells in each category is provided in Table 8. Only grid cells with at least four checklists in both SABAP1 and SABAP2 are shown. Fuller information on the interpretation of this range-change map is provided in Underhill & Brooks (2016b).

Table 8. Range-change summary for the White Stork between SABAP1 and SABAP2. Numbers (and percentages) in each colour category of Figure 32, for which there are at least four checklists per quarter degree grid cell in both SABAP1 and SABAP2. 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	4+ checklist for SABAP1 and SABAP2		30+ checklist for SABAP1 and SABAP2	
	Count	%	Count	%
Red (very large decrease)	290	51	672	58
Orange (large decrease)	124	22	184	16
Yellow (small decrease)	48	8	75	6
Light green (small increase)	32	6	60	5
Dark green (large increase)	39	7	54	5
Blue (very large increase)	41	7	121	10
Total	574	100	1166	100

Acknowledgements

This paper is part of a series which celebrates the contributions of thousands of citizen scientists to the databases of the first and second bird atlas projects in southern Africa (SABAP1 and SABAP2). From 2007 to March 2017, SABAP2 (Underhill 2016) was a partnership project of SANBI (South African National Biodiversity Institute), BirdLife South Africa and the Animal Demography Unit in the Department of Biological Sciences at the University of Cape Town.

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