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Les G Underhill and Michael Brooks

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PROJECT REPORT

SABAP2 AFTER NINE YEARS, MID 2007–MID 2016: COVERAGE PROGRESS AND PRIORITIES FOR THE SECOND SOUTHERN AFRICAN BIRD ATLAS PROJECT

Les G Underhill and Michael Brooks

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

Introduction

The Second Southern African Bird Atlas Project (SABAP2) started on 1 July 2007. On 30 June 2016, nine years of fieldwork for the project had been completed. This paper shows the year-by-year coverage maps, and reviews regional progress after nine years. Finally, it describes the priorities for each of the project's 11 organisational regions for the 10th year of the project.

Understanding the progress and priorities is facilitated by an understanding of data submission rates (Figure 1). The first year of the project was a start-up year, and the rate of submission reached a plateau from 2009/10 to 2013/14. The two most recent years have seen a surge in submission of checklists, driven largely by the development of the BirdLasser app, which removes two barriers to participation: the skill of map-reading and the chore of data entry, enabling atlasers to focus on birds and bird identification.

The paradigm which underpins SABAP2 is gradually shifting. The initial concept was to develop a new set of bird distribution maps for South Africa, Lesotho and Swaziland over a period of a years. The new paradigm is the realization that SABAP2 represents a powerful tool for monitoring changes in bird communities through time. In some parts of the SABAP2 region, this paradigm shift has already taken place. Monitoring has become the primary goal. But important gaps in basic coverage remain; in these regions, mapping bird distributions remains the primary paradigm.

Cumulative coverage maps

The coverage maps at the ends of years one to nine show the spatial development of SABAP2 (Figures 2–10). In broad brush terms, and especially in the first two years (Figures 2–3) coverage was strongly correlated with centres of human population. From the third year onwards, atlasing expeditions were being held in rural areas, especially along the axis of the N14, which runs from Pretoria, across North West and the Northern Cape through Kuruman towards Springbok (Figures 4–6). By the end of the ninth year (Figure 10), the correlation between coverage and the human population was still evident, with extensions of coverage into the countryside surrounding the large cities. This is especially noticeable for Bloemfontein in the Free State. However, in addition, there was good coverage in many thinly populated areas.

The most eye-catching feature of the final coverage map in this series (Figure 10) is the square centred on Gauteng. This covers four one-degree cells (25S 27E, 25S 28E, 26S 27E and 26S 28E). Every one of the 576 pentads in these four one-degree cells is coloured "blue" (or darker), indicating that every pentad has at least 11 checklists (Ainsley 2016). Given that 24% of South Africa's human population lives in Gauteng (Statistics South Africa 2015), it is likely that close to 30% of the country's population lives within these four degree cells. The total number of people living in these four degree cells, "Greater Gauteng", is increasing rapidly, as is the proportion of the South African population living in them. The net migration into Gauteng was estimated at more than 100,000 people per year over the period 2001–16 (Statistics South Africa 2015).

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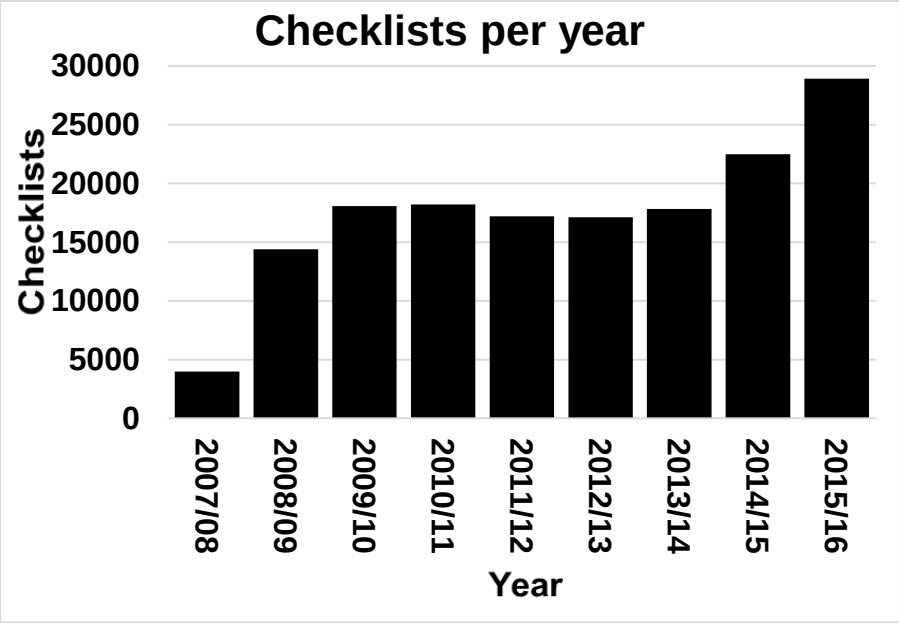

Figure 1. The number of checklists submitted to SABAP2 in each of the nine years of the project, 2007/08 to 2015/16.

Foundational coverage of a pentad is defined as minimum of four checklists; these pentads are coloured green or darker on the coverage maps (Figures 2–10). Four carefully made full-protocol checklists, preferably from different times of the year, provide a good basic list of the species which regularly occur in the pentad. By mid-2016, there were many extensive areas with low-density human population but with good foundational coverage (Figure 10). Some of the more striking were the Kruger National Park, two broad corridors across Mpumalanga from Greater Gauteng eastward and south-eastward, large parts of the interior of KwaZulu-Natal, the regions of the Western Cape called the Swartland and the Overberg, the region north of Upington in the Northern Cape, the Bethlehem region of the Free State, the Middelburg region of the Eastern Cape stretching westward towards the Beaufort West region of the Western Cape, the south-westward extension of the Greater Gauteng square into North West Province, and the northward extension of this square into Limpopo.

Regional coverage in the nine provinces of South Africa, in Lesotho and in Swaziland

The “organisational units” of the initial SABAP2 area were the nine provinces of South Africa, plus Lesotho and Swaziland. We consider coverage in each of these regions at the end of June 2016 (Table 1).

In mid-2016, nine years after the start of SABAP2, the overall coverage of the 17,339 pentads of South Africa, Lesotho and Swaziland was 75.7% (Table 1). More than half, 51.5%, of pentads had two or more checklists. Nearly one-third, 32.7%, had the foundational coverage of four or more checklists. One-fifth, 20%, had seven or more checklists (Table 1).

Six of the nine provinces of South Africa had coverage above 90%: Gauteng (100%), Mpumalanga (99.8%), KwaZulu-Natal (99.5%), Free State (97.9%), Limpopo (95.2%) and Western Cape (90.0%). Four provinces had more than 75% of their pentads visited at least twice, and the same four provinces had 50% of their pentads visited more than four times: Gauteng (100% and 100%), Mpumalanga (88.8% and 73.9%), KwaZulu-Natal (87.2% and 62.2%), and Western Cape (76.0% and 57.7%). Three provinces had more than 40% of their pentads visited at least seven times: Gauteng (100%), Mpumalanga (43.0%) and KwaZulu-Natal (40.2%) (Table 1).

Only two of the 11 regions had overall coverage below 50% by mid-2016. The sparsely populated Northern Cape was on 48.9%, and the high altitude Lesotho was on 28.1% (Table 1).

Table 1. Progress statistics at the end of June 2016 for the 11 SABAP2 regions, the nine provinces of South Africa, and Lesotho and Swaziland. These statistics are based on full-protocol checklists only, i.e. checklists with at least two hours of intensive birding.

Province/ country	Pentads	Pentads with N or more checklists in each region, and regional percentages								Checklists	Records
		1+	%1+	2+	%2+	4+	%4+	7+	%7+		
Eastern Cape	2256	1617	71.7%	1101	48.8%	632	28.0%	372	16.5%	14799	795822
Free State	1861	1822	97.9%	1136	61.0%	616	33.1%	288	15.5%	11769	638415
Gauteng	270	270	100.0%	270	100.0%	270	100.0%	270	100.0%	23702	1264820
KwaZulu-Natal	1294	1288	99.5%	1129	87.2%	805	62.2%	520	40.2%	22315	1264163
Lesotho	416	117	28.1%	59	14.2%	19	4.6%	12	2.9%	512	14280
Limpopo	1616	1539	95.2%	943	58.4%	587	36.3%	334	20.7%	12364	709934
Mpumalanga	1015	1013	99.8%	901	88.8%	750	73.9%	436	43.0%	14927	816179
North West	1482	1162	78.4%	693	46.8%	382	25.8%	292	19.7%	10948	600994
Northern Cape	5087	2485	48.9%	1222	24.0%	519	10.2%	221	4.3%	8544	323357
Swaziland	205	156	76.1%	75	36.6%	37	18.0%	27	13.2%	871	57282
Western Cape	1837	1654	90.0%	1396	76.0%	1060	57.7%	701	38.2%	27661	1323020
Total	17339	13123	75.7%	8925	51.5%	5677	32.7%	3473	20.0%	148412	7808266

The total number of full–protocol checklists submitted over the nine years of the project was 148,412, and the total number of records of bird distribution on these checklists was 7.8 million (Table 1). Three provinces had submitted more than one million records (Western Cape, Gauteng and KwaZulu-Natal).

The number of checklists submitted in 2014/15 and 2015/16 showed growth rates exceeding 25% per year over the preceding year (Figure 1). This remarkable pattern is the factor that gives us the courage to set priorities for the year 2016/17.

Regional priorities for the nine provinces of South Africa, and for Lesotho and for Swaziland

Global and regional priorities

There is no pentad for which SABAP2 has “enough” checklists. It is especially for the pentads which already have large samples of checklists that ongoing data is particularly valuable. Pentads 2605_2755 (Sandton) and 2605_2800 (Cresta) are statistical heaven, because, by mid-2016, they had 1385 and 1328 checklists respectively. This enables sensitive analyses of changes in bird community structure and even changes in seasonality to be

examined at a local scale. These analyses are extremely important in an era of rapid infrastructural development and ongoing climate change. Thus first prize in every pentad remains carefully and diligently made full-protocol checklists. This is the global priority, applying to every pentad.

In addition to this atlas-area wide injunction, there are also regional priorities. These priorities are guided mostly by Table 1 and Figure 9. The description of these priorities is intended to help guide atlasers to the areas where their involvement will generate the biggest gains for the project as a whole.

Eastern Cape

Coverage in Eastern Cape grew steadily from 68.0% to 71.7% in the year ending June 2016; after the Northern Cape, this was the fastest growth rate of any atlas region. The top priority is to improve overall coverage in the Queenstown district and the former Transkei. There is a scattering of gaps that need attention. Getting 50% of the province to two-checklist coverage is within reach. Coverage in the fracking area in the northwest section of the province is improving steadily and also getting deeper. This remains a priority.

Free State

Overall coverage of the Free State reached a remarkable 97.9%. But of the provinces with more than 90% coverage, the Free State has the largest percentage which are yellow on the coverage map, with only one checklist in 36.9% (=97.9%–61.0%). Priorities should be to transform the predominantly “yellow” Free State (Figure 10) first into the “orange” Free State and then on to the “green” Free State. Good targets are to get the green Bethlehem district to merge with the green Bloemfontein district, and to join these with green bands to Kimberley and Greater Gauteng.

Gauteng, i.e. the four degree cells of Greater Gauteng

The four degree cells of Greater Gauteng contain 576 pentads, of which 270 are in Gauteng itself, and the remaining 306 are mainly in North West and Limpopo, as well Mpumalanga and Free State. The goal of getting every one of the pentads within Greater Gauteng to a minimum of 11 checklists was achieved on 29 June 2016; evidence of this is that every pentad within Greater Gauteng is coloured “blue” on the 2016 coverage map (Figure 10) (Ainsley 2016).

In Greater Gauteng, the paradigm for what the bird atlas protocol is capable of achieving has changed radically. This region is leading the world in turning atlasing (defined as finding the basic distributions of species) into spatial monitoring (establishing how distributions are changing through time). The need for monitoring is larger here than elsewhere in South Africa; with c. 30% of South Africa’s population living in this region, the pressure of development is largest.

By June 2016, 80% of the pentads in Greater Gauteng had already been visited in the first six months of the 2016, with six months for the remaining 20%. 3510 checklists were made during this period, which is an average of six checklists per pentad. Given this breadth of coverage in a six-month period, and the volume of checklists atlasers resident here are capable of producing, the atlasers of Gauteng should possibly consider separate summer and winter challenges. The summer challenge could run from October to March each year and the winter challenge from April to September. This strategy would upgrade the monitoring capability of the bird atlas in Greater Gauteng.

KwaZulu-Natal

With 99.5% overall coverage, and 87.2% two-checklist coverage, the next priority for KwaZulu-Natal is to increase four-checklist coverage

above the June 2016 level of 62.2% and to become the "green" province.

KwaZulu-Natal's special ornithological advantage is the massive altitudinal gradient between the Drakensberg and the coastline. It is one of the best places in the world to study altitudinal migration, an opportunity currently being exploited by ADU MSc student, Tanya Scott. This makes seasonal atlasing in KwaZulu-Natal a priority, and especially getting more checklists for higher altitudes in winter, however difficult these are to do and however short the lists turn out to be. The short lists of winter provide insights into which species have migrated to lower and warmer altitudes.

Lesotho

Lesotho remains a massive challenge for SABAP2. It needs a champion. By mid-2016, only 28.1% of its 416 pentads had at least one full-protocol checklist. It needs teams of adventurous atlasers to mount expeditions to reach the harder to explore high-altitude regions. There is a particular need for winter checklists, however short they are, to provide hard evidence of altitudinal migration.

Limpopo

Basic coverage in Limpopo grew rapidly over the past few years, and reached 95.5% by mid-2016. This basic coverage is in the process first of graduating to become two-checklist coverage, creating the "orange" Limpopo, and will then need to evolve into four-checklist coverage, the "green" Limpopo.

The province shares the Kruger National Park with Mpumalanga. All the national parks are priorities for using atlasing as a monitoring technique. So there is a special emphasis on getting as many full-protocol checklists as possible on an annual basis.

Mpumalanga

Mpumalanga had 99.8% overall coverage, and 88.8% two-checklist coverage, so the realistic priority is to increase four-checklist coverage above the June 2016 level of 73.9% and to become the "green" Mpumalanga. The GEM project (Greening the Escarpment of Mpumalanga) will contribute to this. After Gauteng, it had the second largest percentage of "dark-green" pentads of any province (43.0%) so the "dark-green" Mpumalanga is a realistic prospect over the next few years, and the Escarpment Bird Club is already working towards this. Maintaining regular annual atlasing of as many pentads as possible within the Kruger National Park and surrounding areas is another priority.

Limpopo and Mpumalanga: Turning Kruger Green: The objective of the Turning Kruger Green project was to obtain foundational coverage of four checklists for every one of the pentads in the Greater Kruger National Park, including those without public road access. The study area was defined as the 446 pentads in South Africa, east of 31°E and north of 26°S. At the end of June 2016, only 18 checklists were needed in eight different pentads to reach the target and the completion of this project is in sight. For the next few years, the priority for the Greater Kruger National Park cannot be "Turning Kruger Dark Green." Access to the pentads without public road access is too difficult. The focus needs to shift from mapping, producing the comprehensive distribution maps, to monitoring. This requires multiple full-protocol checklists, made as carefully as feasible, from as many pentads as accessible, on an annual basis.

By 30 June 2016, 1177 checklists had already been made for these 446 pentads in 2016. A monitoring target of an average of six checklists per pentad per year generates an annual target of 2676 checklists.

North West

By mid-2016, 78.4% of the pentads in North West had at least one checklist. Coverage intensity decreased sharply from east to west. Achieving coverage of the sparsely atlased western edge of North West is the top priority for the province. Systematically improving depth of coverage from the western edge of Greater Gauteng eastward towards the border with Botswana is another priority.

Northern Cape

First target for the Northern Cape is to get overall coverage above 50%. In the past year, June 2015 to June 2016, coverage increased by 5.1%, from 43.8% to 48.9%, so 50% coverage should be reached by the end of 2016. The absolute top priority is the sparsely populated area known as Bushmanland, east of the N7, south of the N14 and west of the N10. This area is so thinly populated that the only way it will be covered is through dedicated atlasing expeditions. This is also roughly the "Astronomy Advantage Area" defined by Act of Parliament (Act 21 of 2007, Astronomy Geographic Advantage Act) which has the core of the Square Kilometre Array (SKA) in its geographic centre (Figure 11) (Government Gazette 2014).

In the south of the Northern Cape, getting to four-checklist coverage in the area threatened by fracking remains a priority. The area around Kimberley should investigate the feasibility of establishing a "green" zone. The Northern Cape hosts four national parks and these also need the depth of coverage to be improved.

Swaziland

Like Lesotho, Swaziland is in need of an atlas champion. However, unlike Lesotho, basic coverage was a respectable 76.1% in mid-2016. The priorities are the unvisited pentads mainly in the west of the country, and deepening coverage to a foundation of at least four checklists per pentad. Only 37 of the 205 pentads that constitute Swaziland (18.0%) have four or more checklists.

Western Cape

The Western Cape, in spite of having the largest number of both records and checklists, only achieved 90% basic coverage in June 2016. The largest remaining gap is in the area north of Laingsburg towards the Northern Cape. The bulk of the 42.3% of pentads with fewer than four checklists lies towards the interior of the province (and some of it is in difficult mountainous regions), and in the Knersvlakte in the northwest, north of Vanryhnsdorp.

The Western Cape, which contains most of the Fynbos Biome, is an important area for shifting gear from simply "mapping" to "monitoring", hence the emphasis in recent years in getting as many pentads as possible visited in the province each year.

Personal, club and group challenges and targets

Many atlasers set themselves personal targets, and we encourage that. Targets include concepts such as visiting all the pentads in their home patch on an annual basis, doing a full protocol checklist in their home pentad every month, getting all the pentads in a few quarter-degree grid cells up to, say, foundational coverage of four checklists, making the first list for at least 10 checklists per year, with many other variations on this theme.

Bird clubs and other groups of atlasers have developed challenges and targets. For example, in the Western Cape, the members of the Stilbaai Bird Club challenged themselves to achieve foundational coverage of the gap between the Garden Route and the Caledon district, and the members of the Namaqua Bird Club are doing

likewise for southern Namaqualand, the Knersvlakte region. These are mapping challenges. The atlasers of Greater Gauteng have devised a monitoring challenge, of getting every one of the 576 pentads in their region visited on a regular basis. There are many other examples.

As the SABAP2 project moves towards its second decade, and the monitoring paradigm steadily takes over from the mapping paradigm, these personal and group challenges will inevitably morph towards monitoring objectives. We strongly encourage atlasers to start developing monitoring targets.

Acknowledgements

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View an animation of Figures 2–10 at http://internal.adu.org.za/upload/uploads/SABAP2_2007-2016_Biodiversity_Obs_7_37.wmv

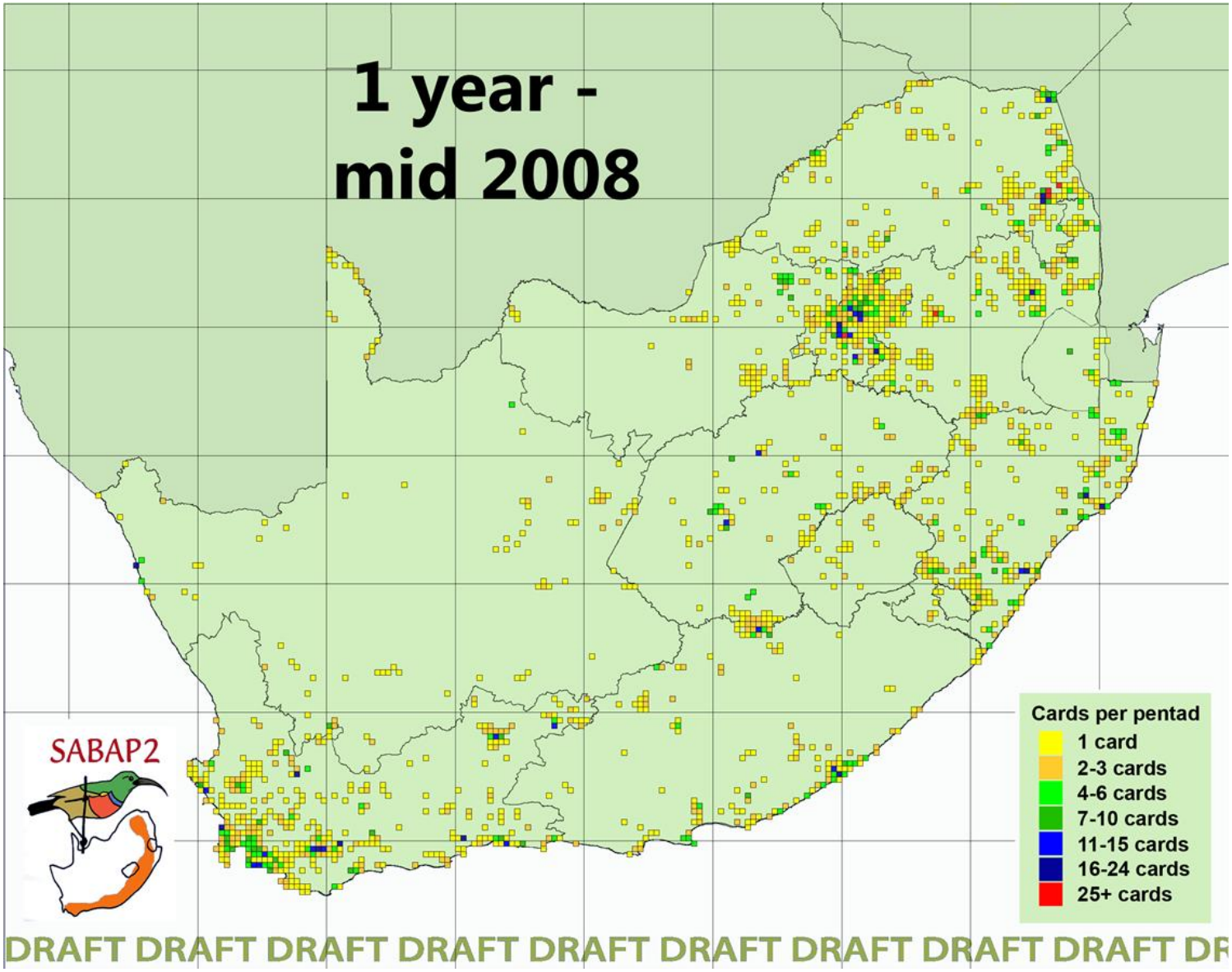

Figure 2. SABAP2 coverage to end of first year of project, mid 2008.

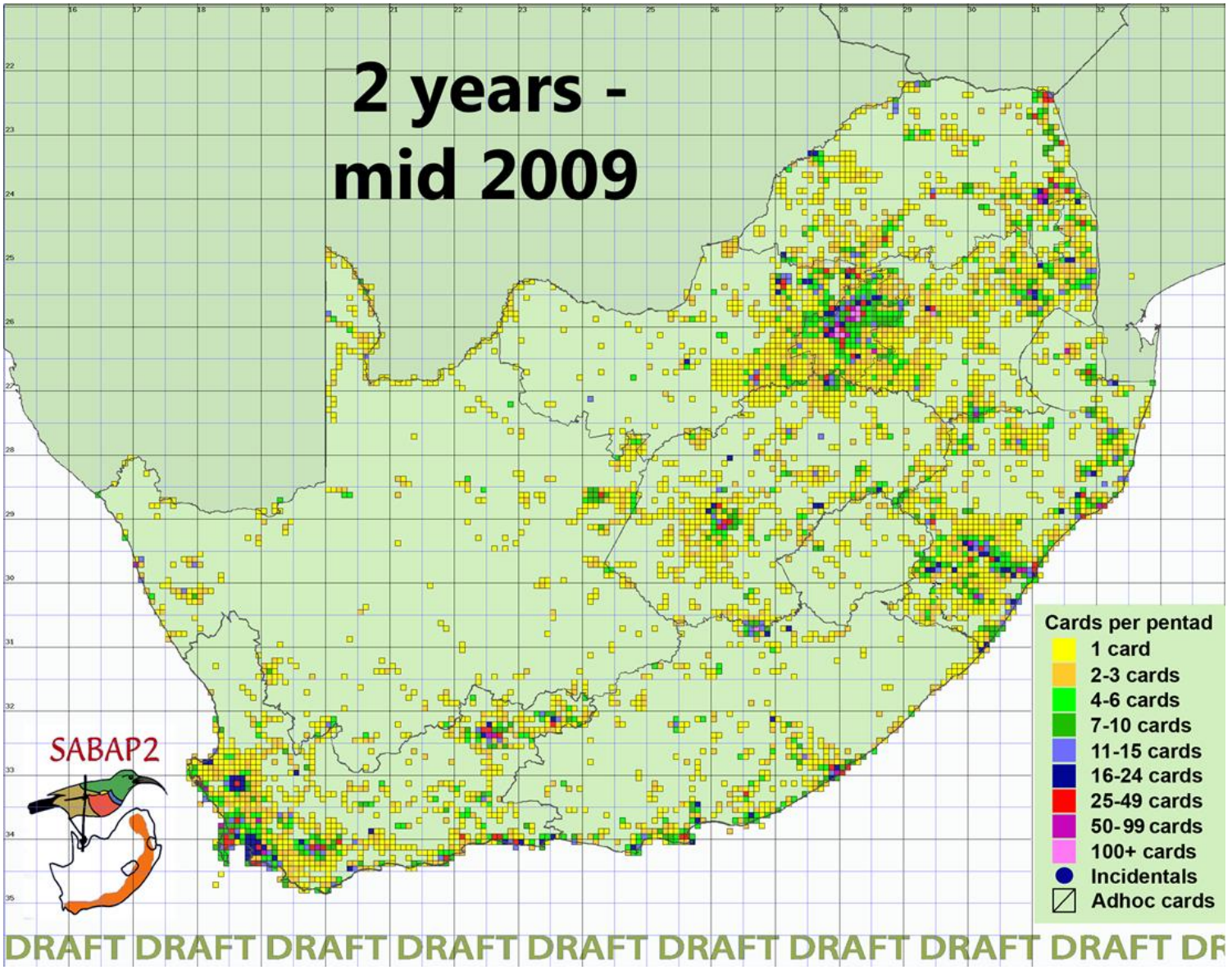

Figure 3. SABAP2 coverage to end of second year of project, mid 2009.

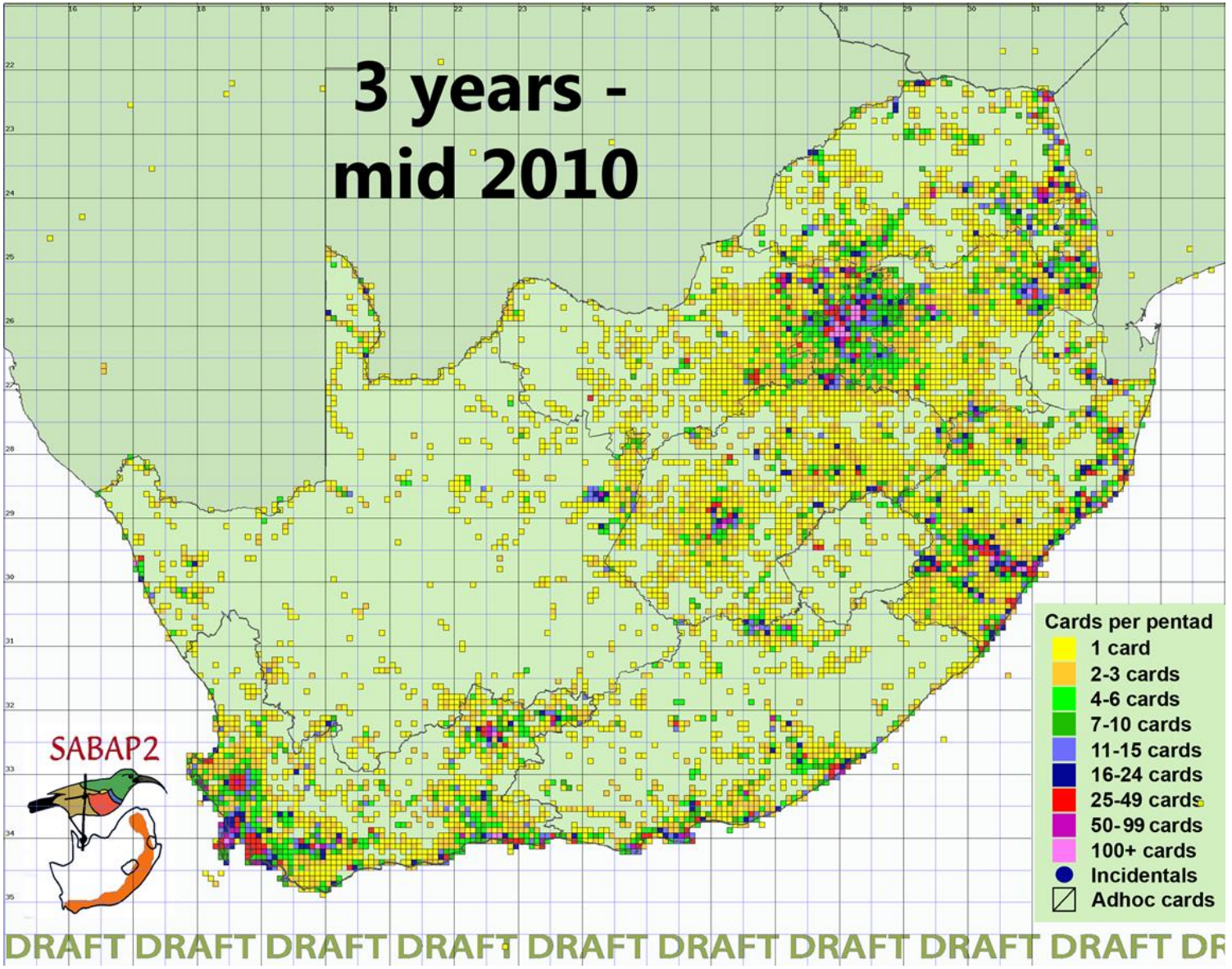

Figure 4. SABAP2 coverage to end of third year of project, mid 2010.

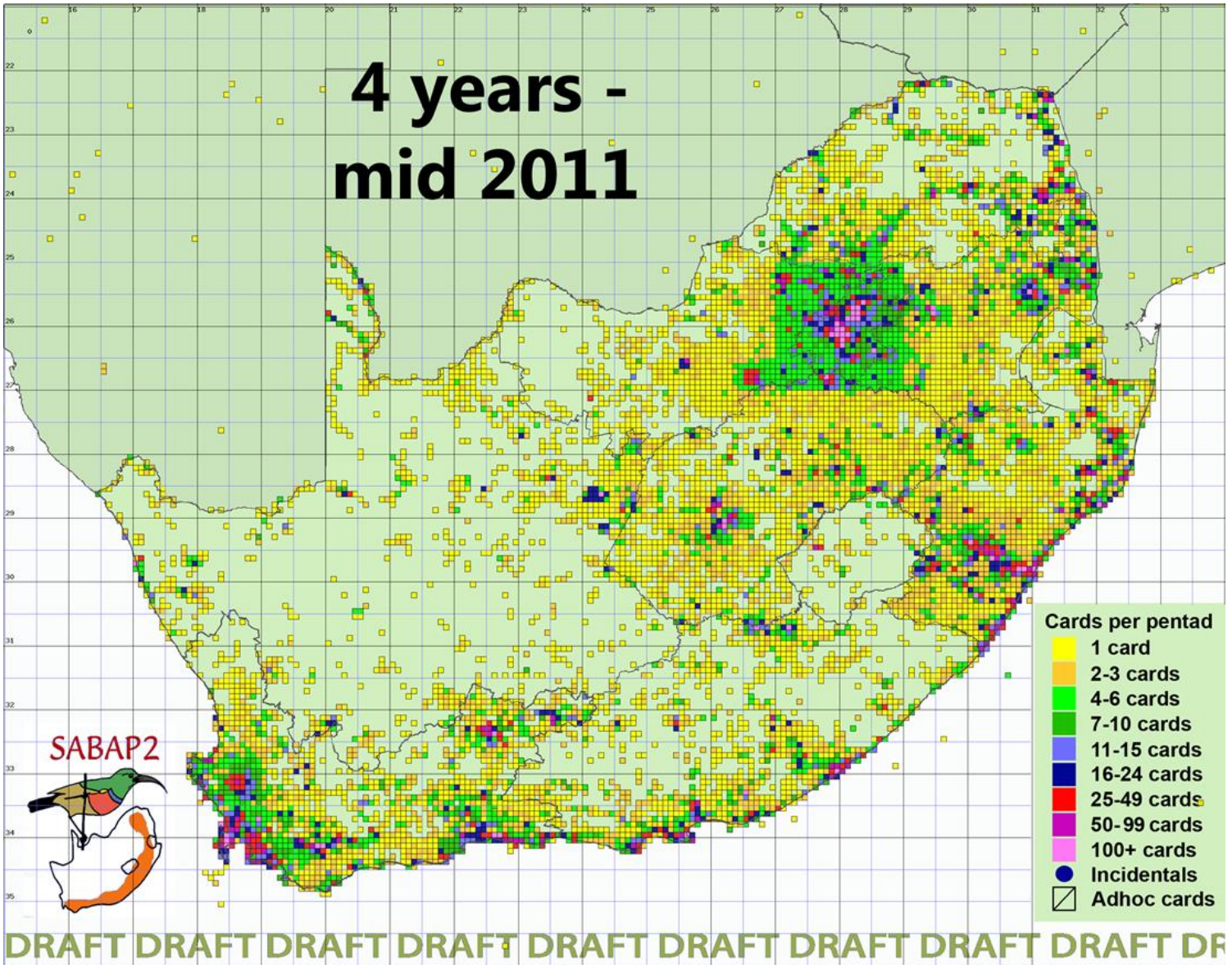

Figure 5. SABAP2 coverage to end of fourth year of project, mid 2011.

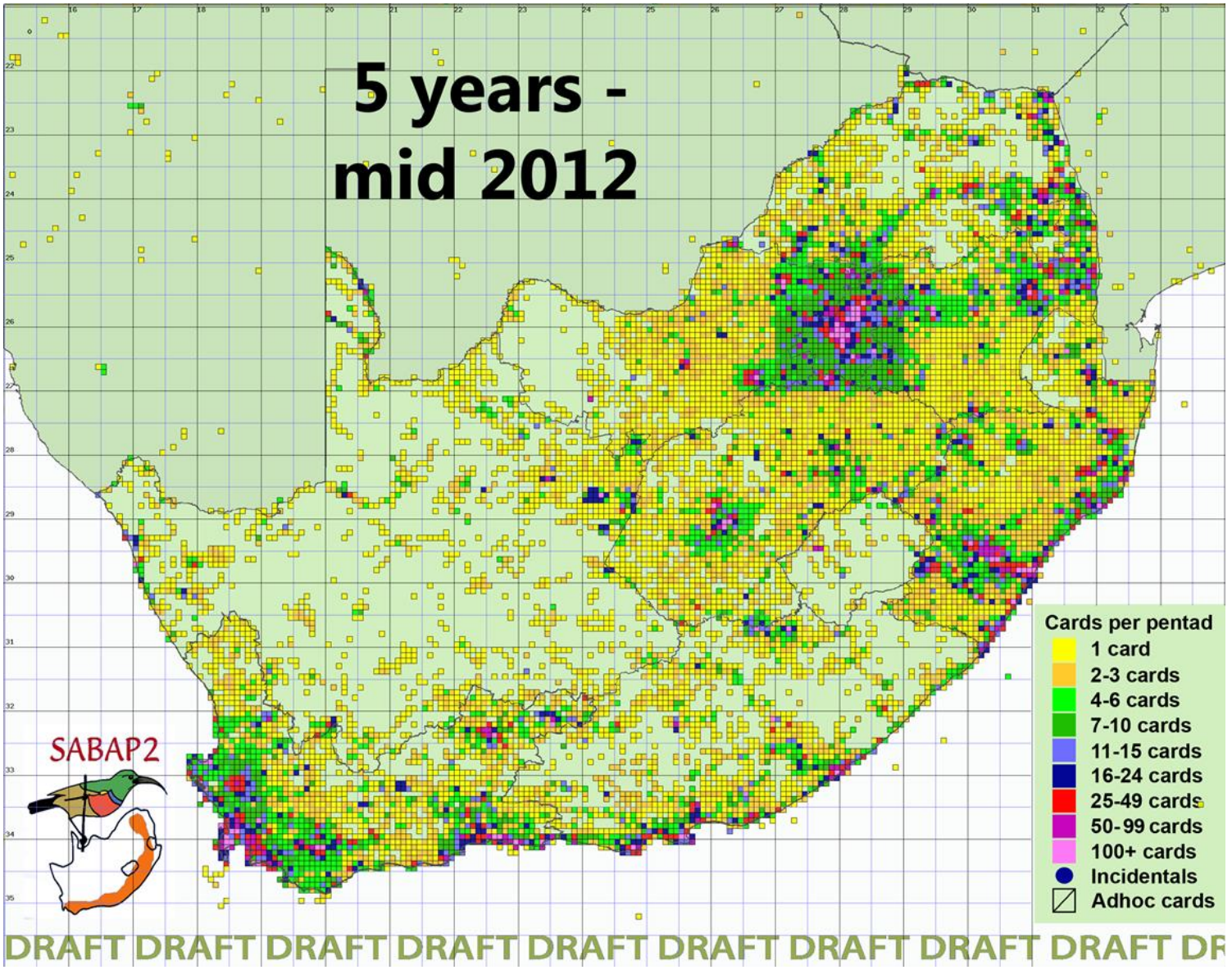

Figure 6. SABAP2 coverage to end of fifth year of project, mid 2012.

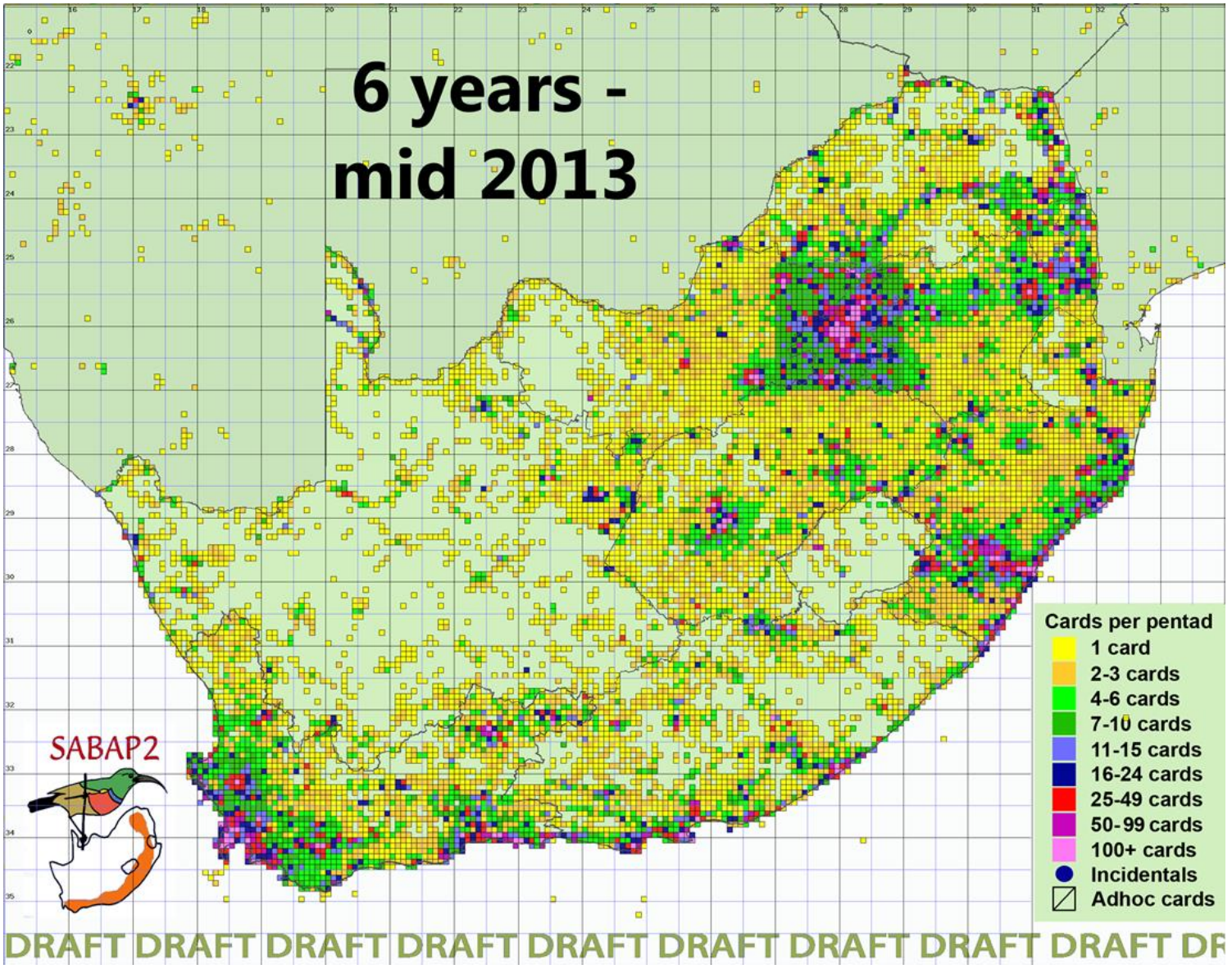

Figure 7. SABAP2 coverage to end of sixth year of project, mid 2013.

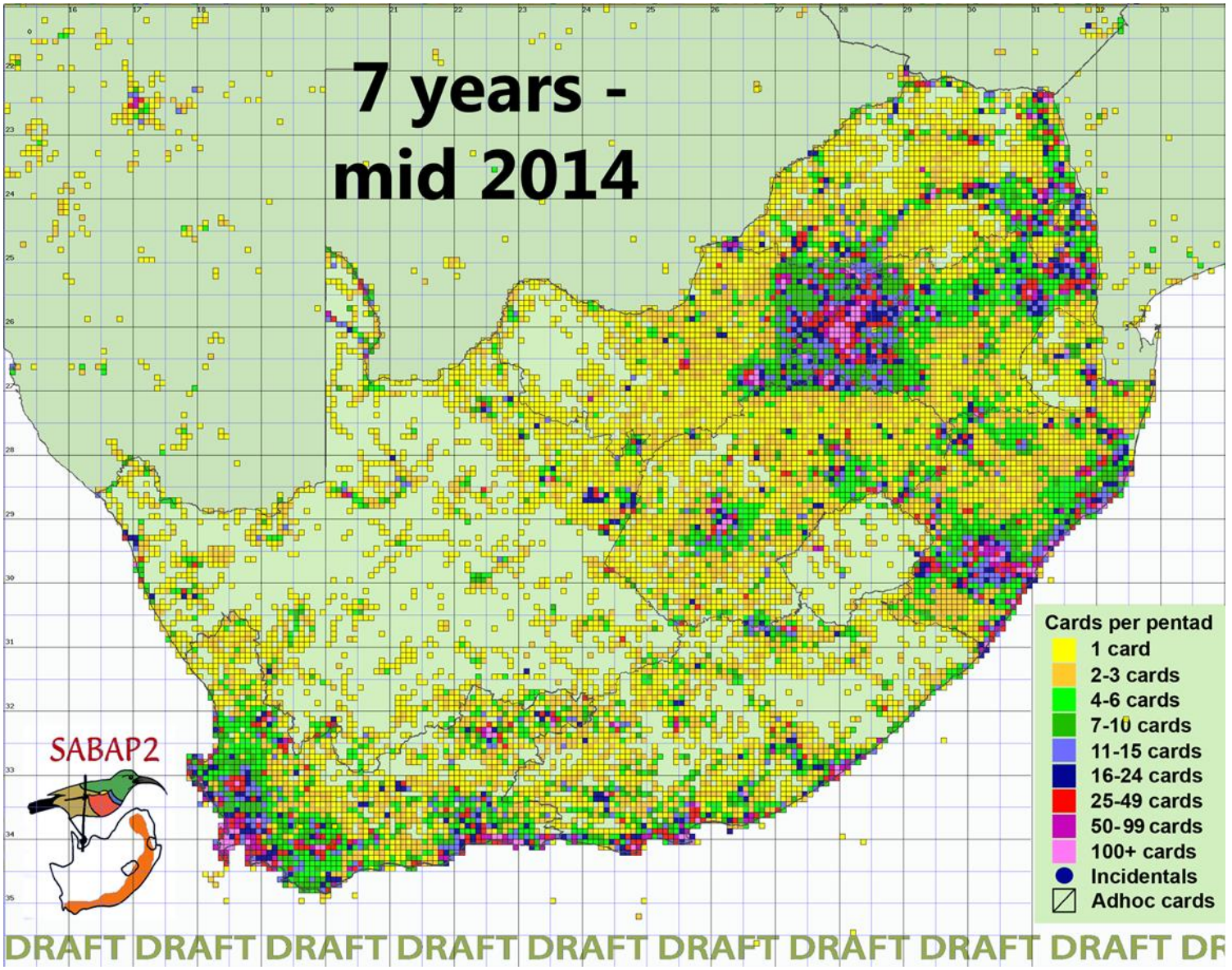

Figure 8. SABAP2 coverage to end of seventh year of project, mid 2013.

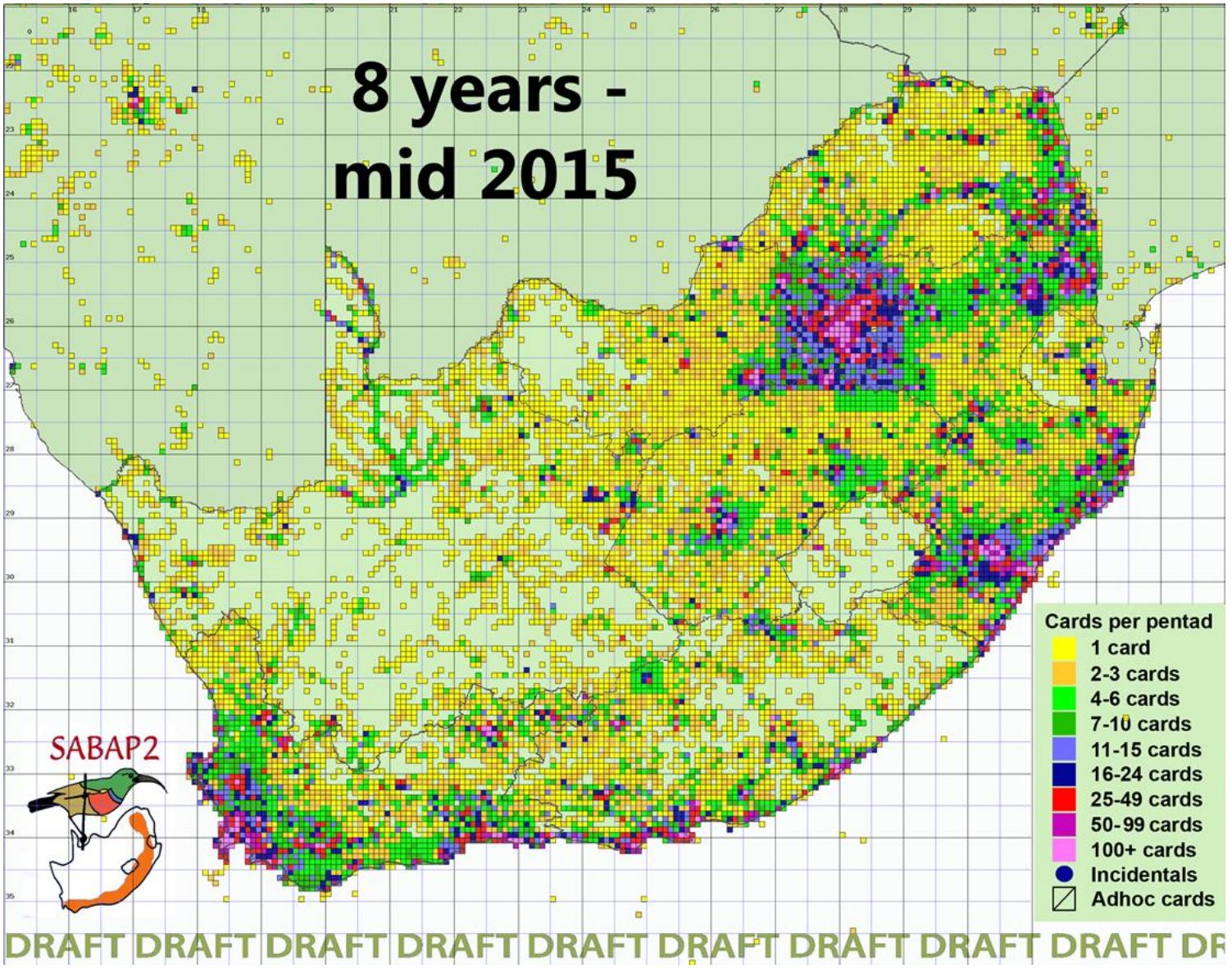

Figure 9. SABAP2 coverage to end of eighth year of project, mid 2015.

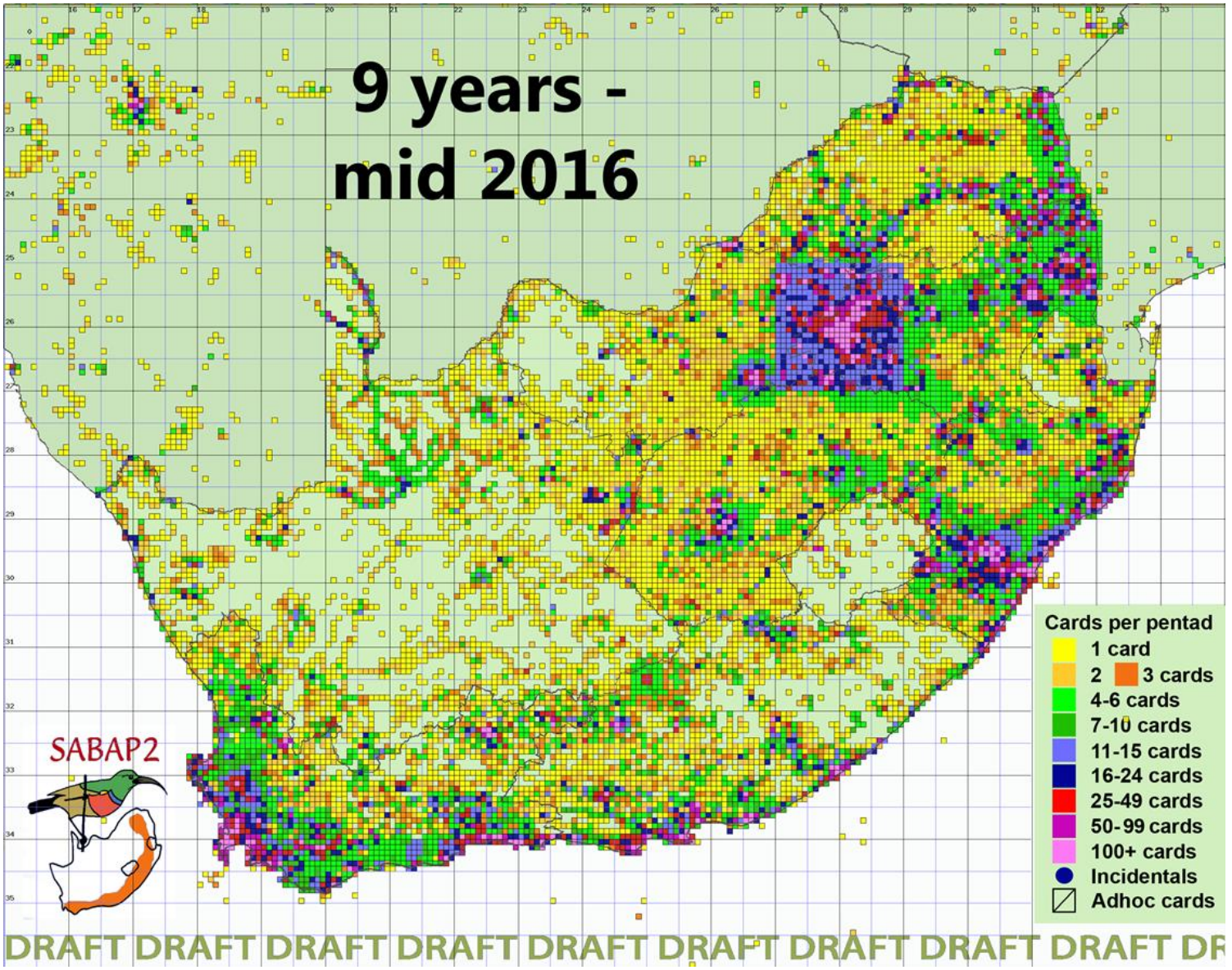

Figure 10. SABAP2 coverage to end of ninth year of project, mid 2016.

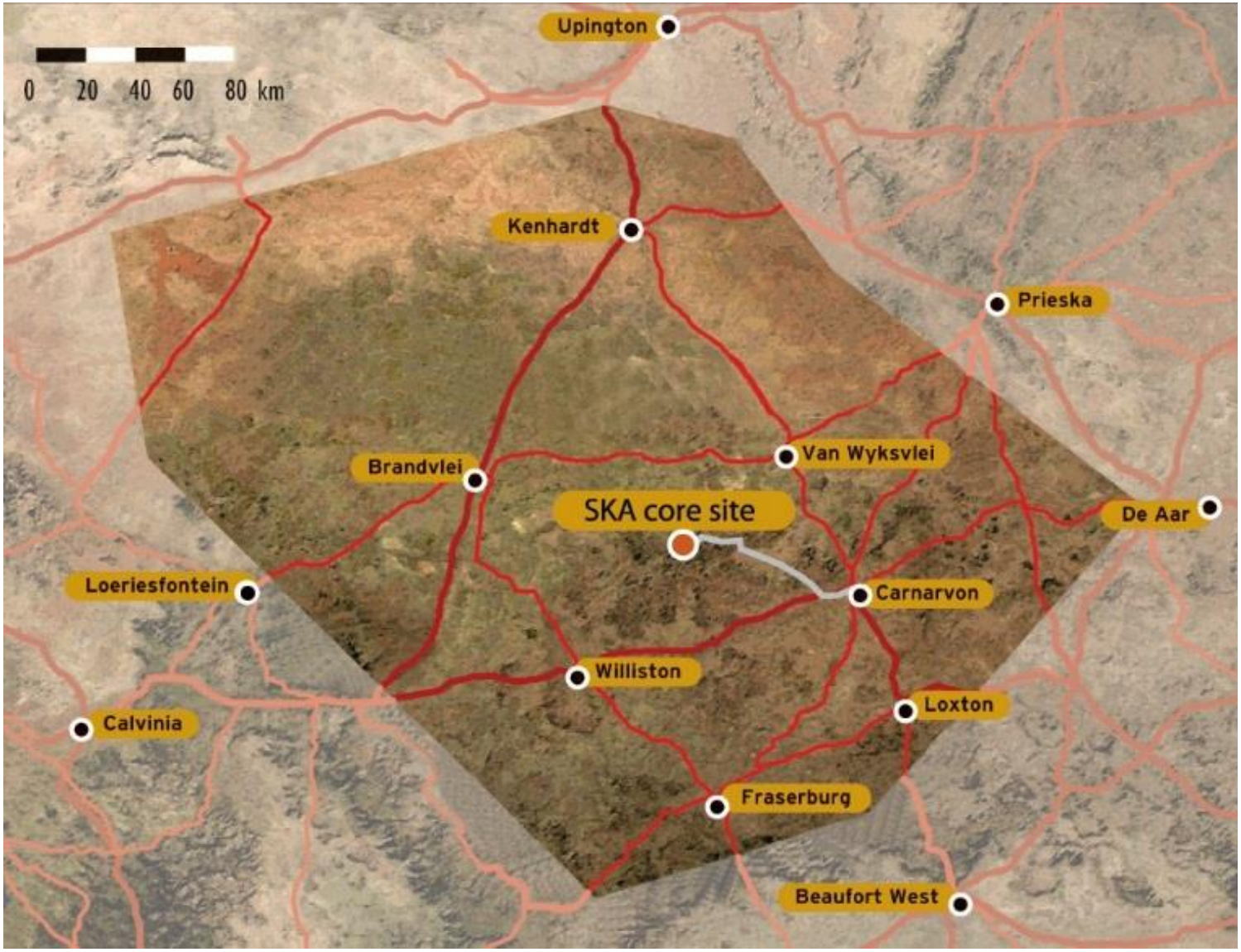

Figure 11. Astronomy Advantage Area, in the central Karoo of the Northern Cape. This area was declared in terms of Act 21 of 2007 (Government Gazette 2014).