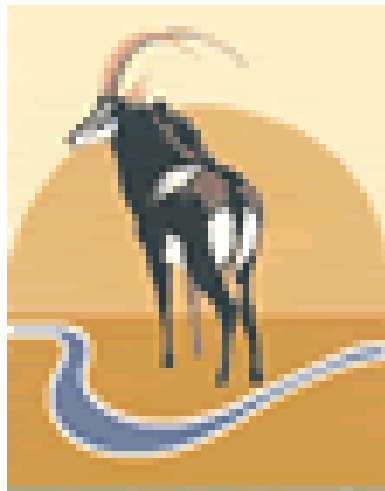


Aerial census of the Shingwedzi catchment
and Limpopo – Elefantes confluence area of
the
Parque Nacional do Limpopo in
Mozambique

30th October to 08th November 2007

W.T. Swanepoel



Wildlife Monitoring Report **01/2007**

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1 INTRODUCTION

No full aerial census of Parque Nacional do Limpopo (Limpopo National Park or PNL) in Mozambique has been conducted. However three surveys have been flown. Two earlier surveys were conducted in the "Sanctuary" area - one was an organized survey conducted by a cooperative international team (Whyte 2004) and a second informal survey (Hofmeyr 2005). Both these surveys were done using the Kruger National Park (KNP) helicopter. In 2006, a fixed wing survey of the Shingwedzi basin was done, using the KNP Cessna 206 (Whyte and Swanepoel 2006).

The Parque Nacional do Limpopo (henceforth PNL) staff were intent on doing a follow up survey to the one conducted the previous year, with the principle aim of monitoring elephant numbers and expansion into the PNL. An additional section, that of the Limpopo-Elefantes confluence area would be surveyed.

Distribution of buffalo and their proximity to cattle was an added factor of this survey after communications with Dr Gavin Thompson of the SADC foot and mouth research program.

A third important aim was to attempt to locate and count the rare antelope existing in, and introduced to, the area.

2 METHODS

2.1 Calibration of the Aircraft

In order to conform with the requirements of the "Distance Sampling" technique, it is necessary to devise a calibration method (which may differ between various aircraft types) so that each observer can assign each observation to a strip coinciding with the required distance from the aircraft. Two different aircraft have been used (a Partenavia P-68 "Observer" and a Cessna 206) and these have required different calibration methods.

In the Cessna 206, calibration require the drawing of horizontal lines on the inside of the windows of the aircraft which indicate the respective strips to the observer. These differ from person to person and are dependant on the height of the observer's eye above the seat, or the specific position that each observer adopts while observing. These lines indicate the four strips, **A** (alpha), **B** (bravo), **C** (charlie) and **D** (delta). The lines on the window must be individually calibrated for each observer. This is done by using the simple equation (see Figure 1):

$$\frac{h}{H} = \frac{w}{W}$$

Where:

h = Height of the observers eye above the hangar floor

H = Height of the aircraft above ground (250ft)

w = Width of the respective strips on the hangar floor

W = Width of the strips on the ground as required for "Distance Sampling" analyses (100m).

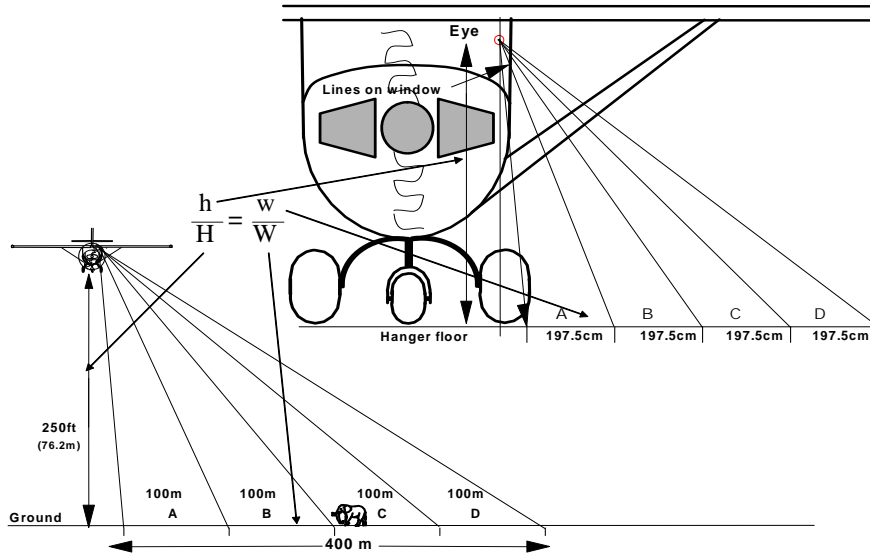


Figure 1: Calibration of a Cessna-206 for aerial "Distance Sampling".

If the height of the aircraft above ground, the proposed strip width, and the height of the observer's eye above the ground when seated in the stationary aircraft are all known, the relative strip widths can be calculated and marked on the hangar floor. An example for an observer is given here.

The equation $\frac{h}{H} = \frac{w}{W}$ then becomes: $\frac{1.505}{76.2} = \frac{w}{100}$

$$\text{or: } w = (1.505/76.2) * 100 = 1.975\text{m}$$

Each mark on the ground must be set 1.975m from its neighbour in a perpendicular direction away from the aircraft. The observer then sits in a comfortable position in the aircraft (the position he/she is likely to maintain while flying the survey) and marks the window on the spot where his/her eye lines up with the markers which have been placed on the ground. This procedure should be followed for each observer, and his/her respective window.

2.2 Flying Times

Ideally two sessions were flown per day, both in the morning before it got too hot. Take off was at a time which allows the actual survey to begin at about 07h30. Ferry times were shorter than in 2006, as Letaba camp was used to count the southern portion of the survey from, after which the team moved up to Shingwedzi to continue the survey of the Shingwedzi catchment area. A refuelling break was taken at ±10h00 and a second session followed until about 12h00.

2.3 Survey Altitude

The survey was flown at an altitude of 250ft above ground level (AGL). Transects were spaced at 800m intervals, observers covering 400m on each side of the aircraft. The aircraft was calibrated for each observer. Strips are indicated on the window for each observer which are calibrated to give a coverage of 400m on each side of the aircraft at an altitude of 250 feet.

2.4 Navigation

Navigation during the survey was assisted by using software acquired from MKH Technologies (Nelspruit, RSA: Phone 013 744 7767; Fax: 013 7447768). This requires a laptop computer to be connected to the aircraft's Global Positioning System (GPS). Global Information System (GIS) shape files of the survey area are downloaded onto the laptop and the aircraft's exact position is then displayed on the laptop's screen on the shape file overlay. The shape files included the road and river systems, and the park boundaries. The required survey transects were then also added. The exact census lines (800m apart) are indicated as another shape file "layer" and during the survey (Figure 2), the pilot keeps the dot indicating the aircraft's position exactly on the relevant survey transect. This allows very accurate transect flying, and the technique has revolutionised this type of census work.

On the first day the census line layer was omitted by the data capturer, and incorrect lines were followed. This oversight had no effect on the final count result, as a more serious problem led to no data being collected for this day.

2.5 Data Capture

Data was captured directly onto the laptop computer by the front seat observer. Upon entry of each observation the computer automatically captured the aircraft's current position from the GPS. Numeric and distributional data were therefore captured simultaneously. The GPS coordinates of aircrafts position were also captured on the computer at 1-second intervals. This indicates the aircraft track during the survey and is shown in Figure 2. This software was also developed by MKH Technologies in Nelspruit.

2.6 Problems encountered during the survey

Unfortunately this survey was fraught with problems, which included technical, human and other circumstances beyond the control of the census team.

Weather

Initially the survey was delayed due to weather not allowing the aircraft to ferry up from the Eastern Cape to the KNP. An entire day was lost due to inclement weather.

Personnel

Due to the heat, it was agreed that only four people would occupy the aircraft, thus rendering the 2007 survey incomparable to the one carried out the previous year.

An additional setback was that three different individuals assisted with data capture during the survey, which is not ideal for getting consistent values for the entire count.

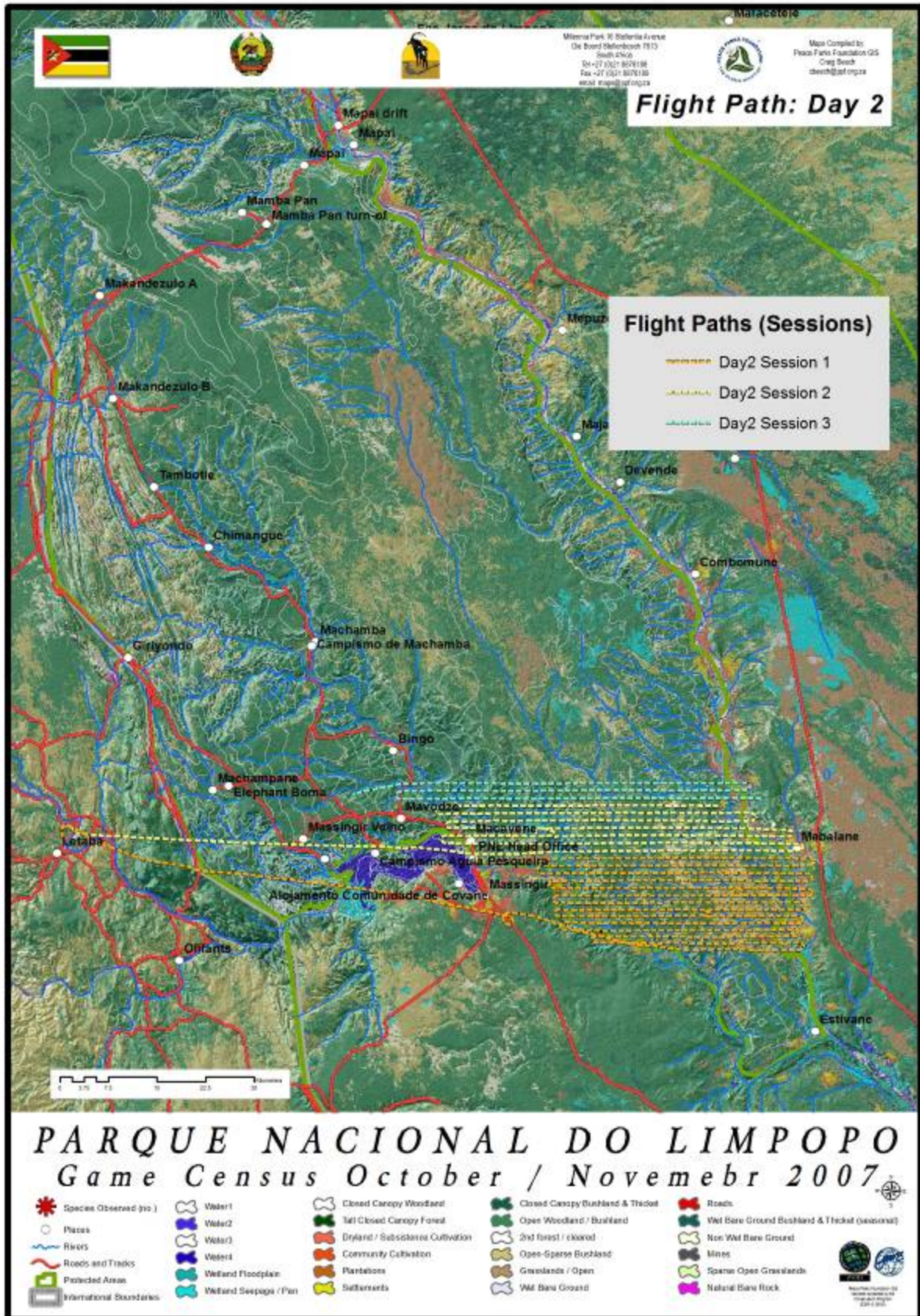
Computer

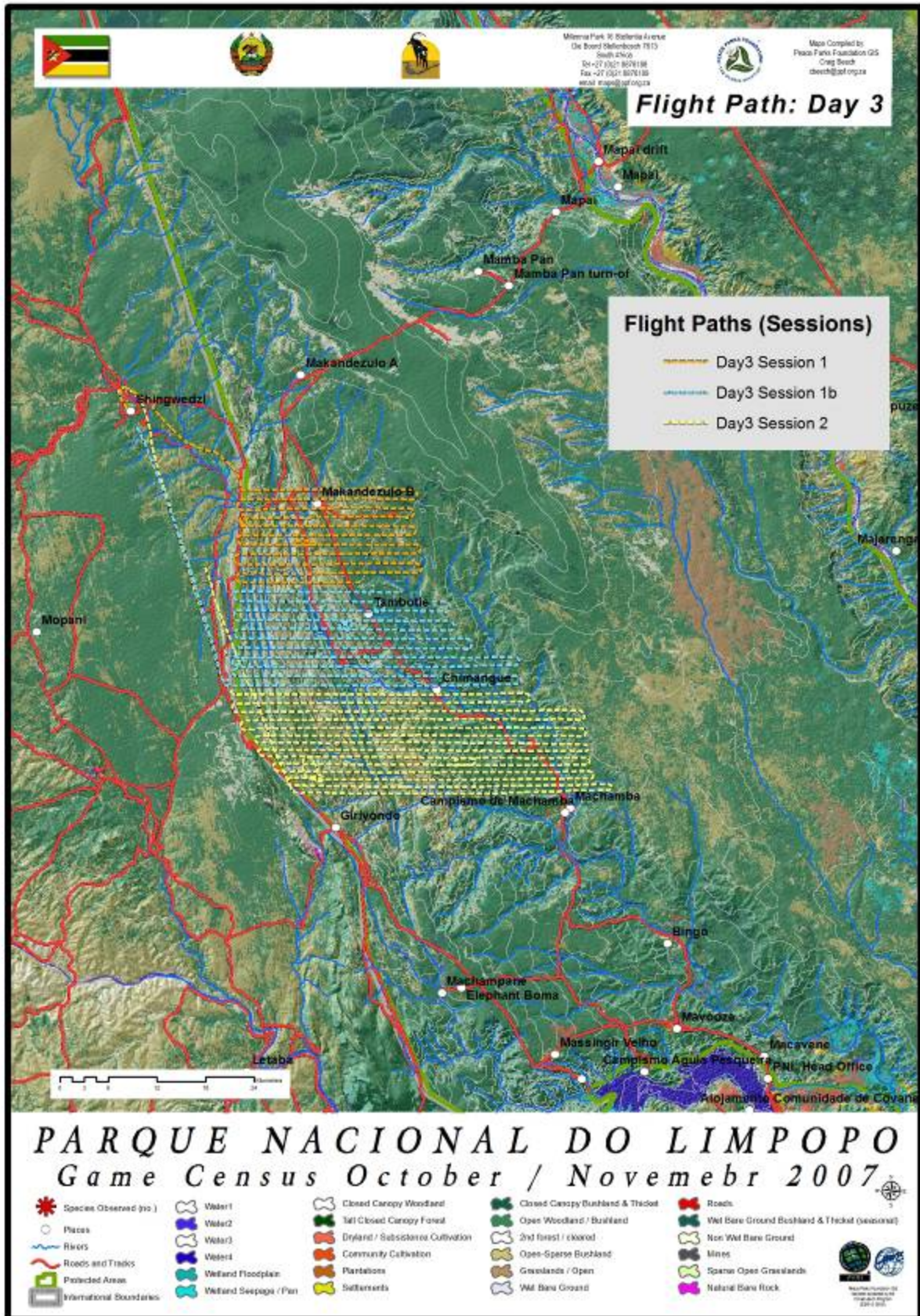
The data of the first two days was totally lost. It seems that the computer, while visibly accepting count data, and continuously showing a moving cursor indicating that the GPS was connected, was in fact not accepting data which resulted in no data being saved for the first two sessions. A further complication was that the power source to the computer was not working, and thus the aeroplane had to return to Skukuza after the first day to have this rectified.

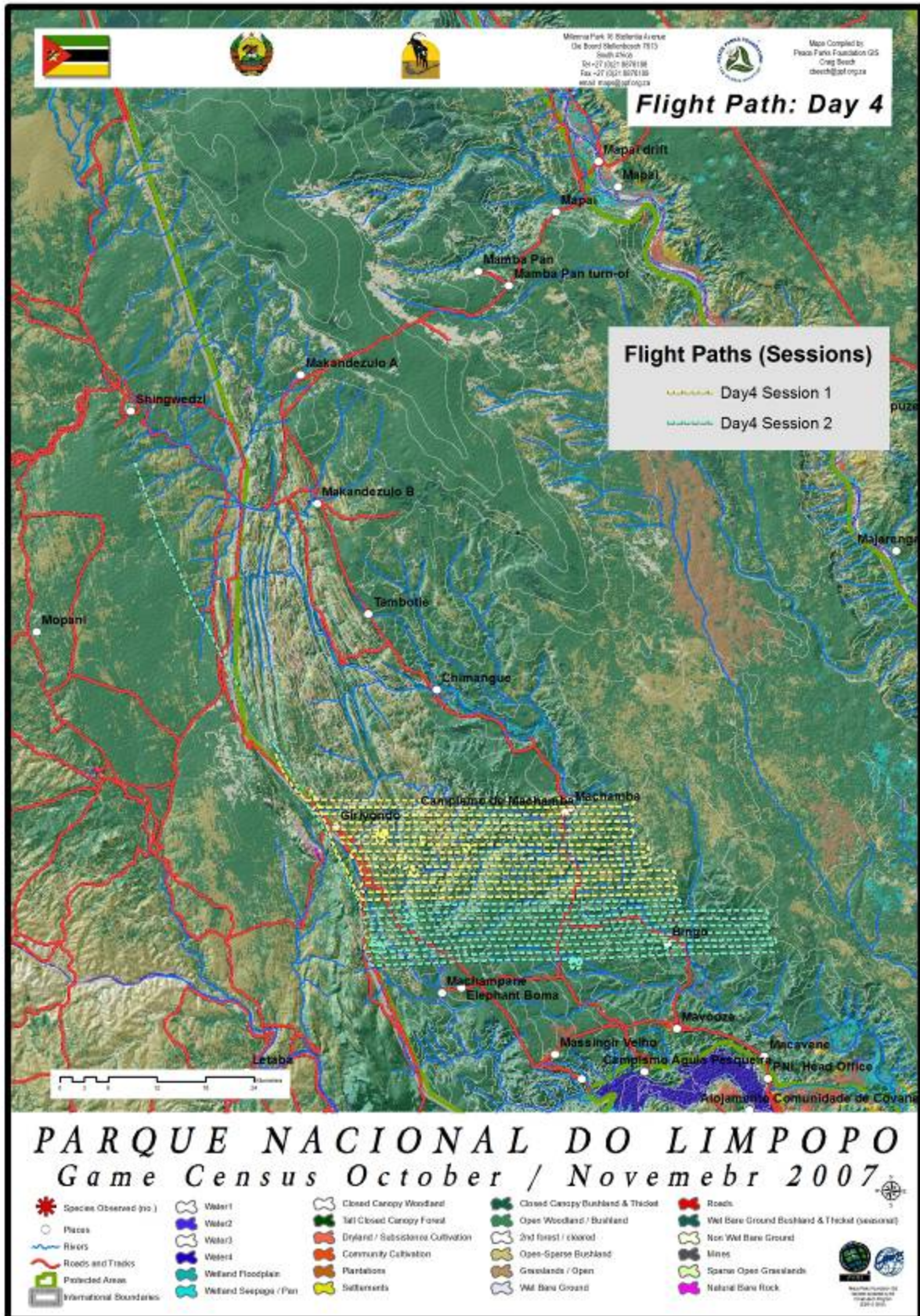
Electrical problems on the aircraft

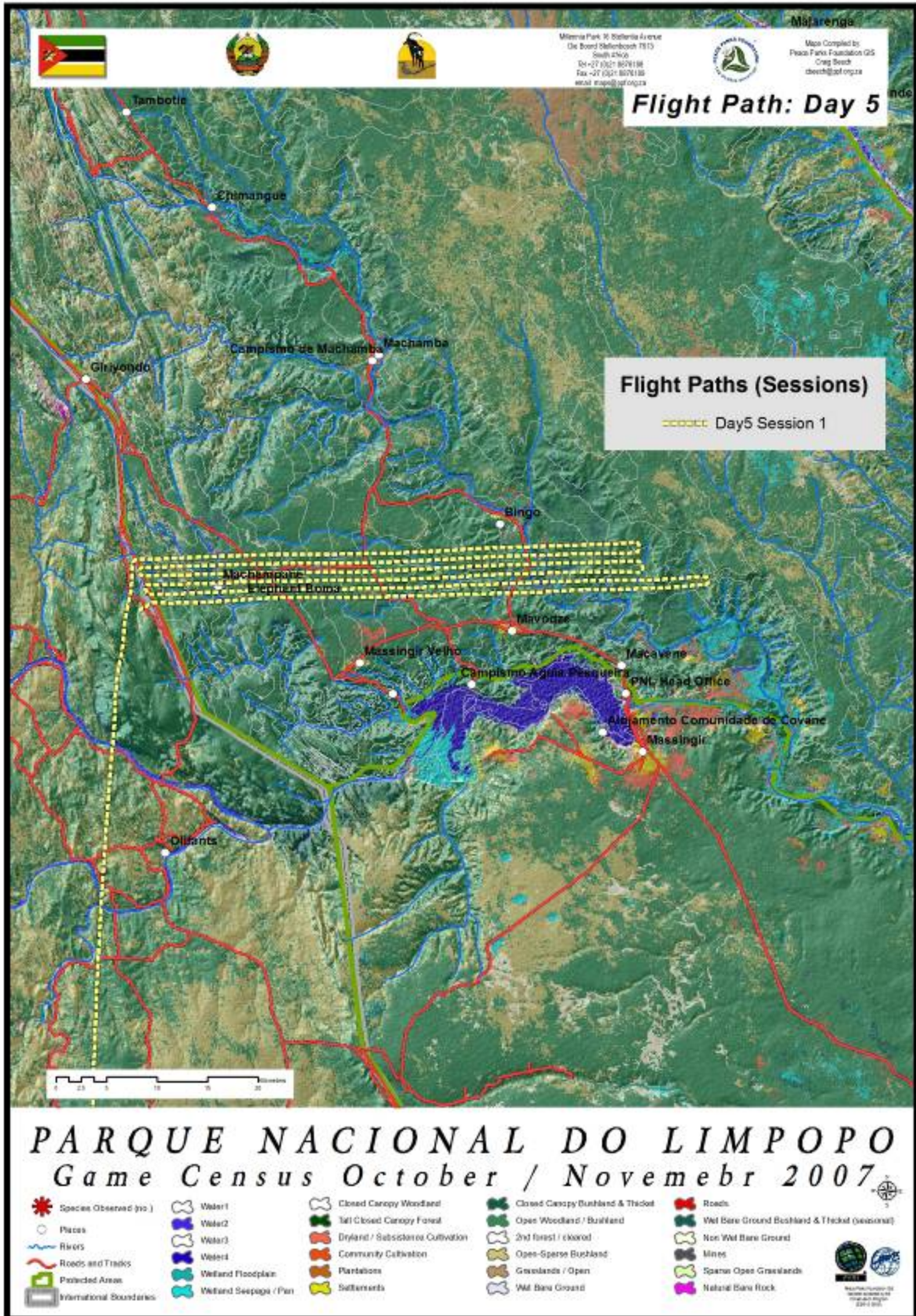
As happened during the 2006 survey, failure of the aircraft's voltage regulator rendered the aircraft unserviceable on the fifth day which resulted in the last part of the survey being cancelled. Two days were spent waiting for the aircraft before the survey was called off. A larger section than the 2006 survey was left uncounted.

Figures 2a-2d: Actual flight lines plotted from GPS tracking data and area surveyed during an aerial survey of the Parque Nacional do Limpopo between 16th and 21st October 2006.









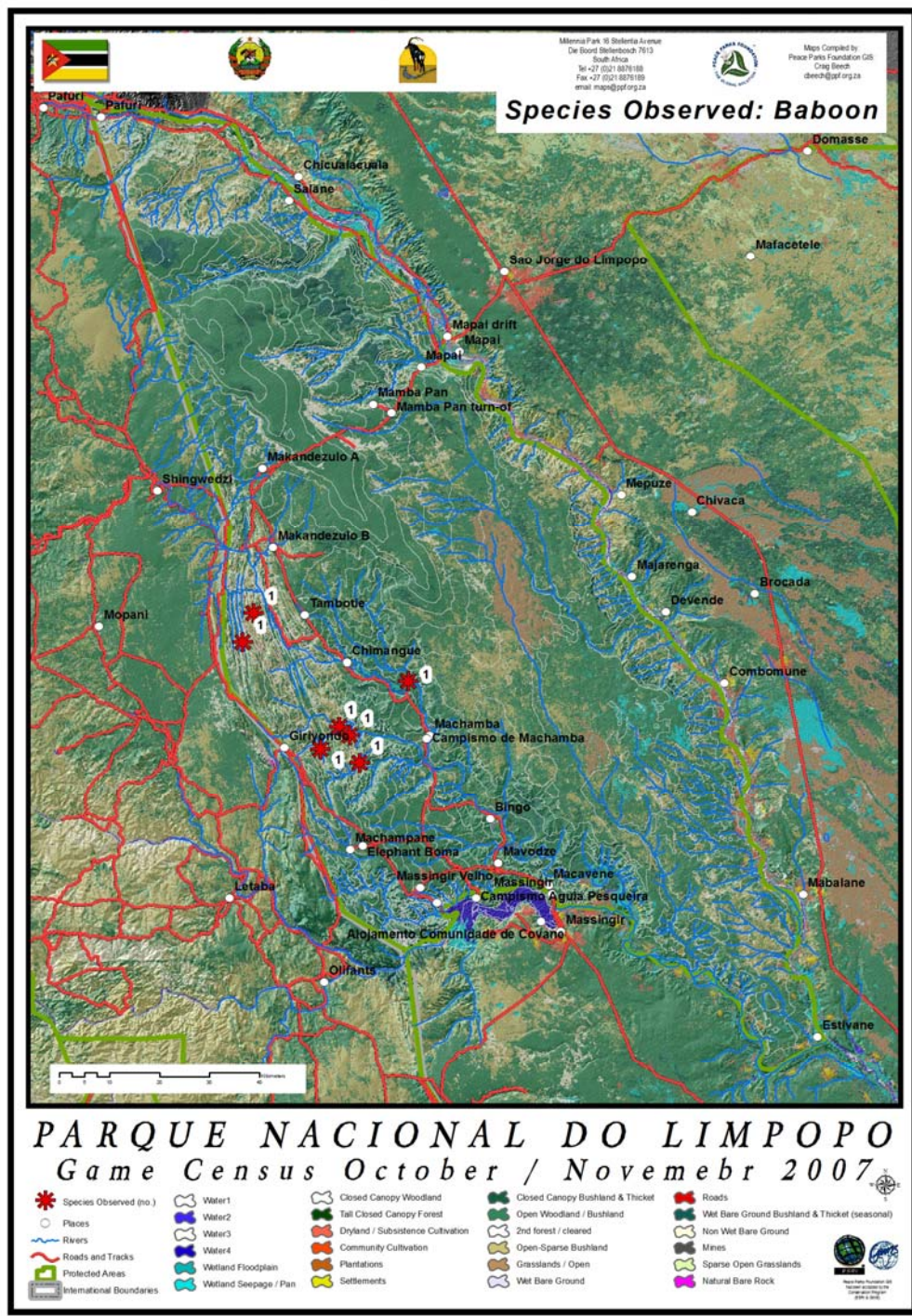
2.7 Census team

The census team was comprised as follows: From SANParks, Mr Grant Knight (pilot) , Miss Martie Pelser (data capture), and from PNL, Mr. Billy Swanepoel (PNL coordinator and Observer), Mr. Guilherme Dos Santos Maluleque (Observer), Mr Stephan Bezuidenhout (data capture) Mr. Obert Mathebula of SANParks serviced the aircraft. Miss Liezl van Lingen did data capture for one session and Mr Trust Maphoto was an observer for the last session flown.

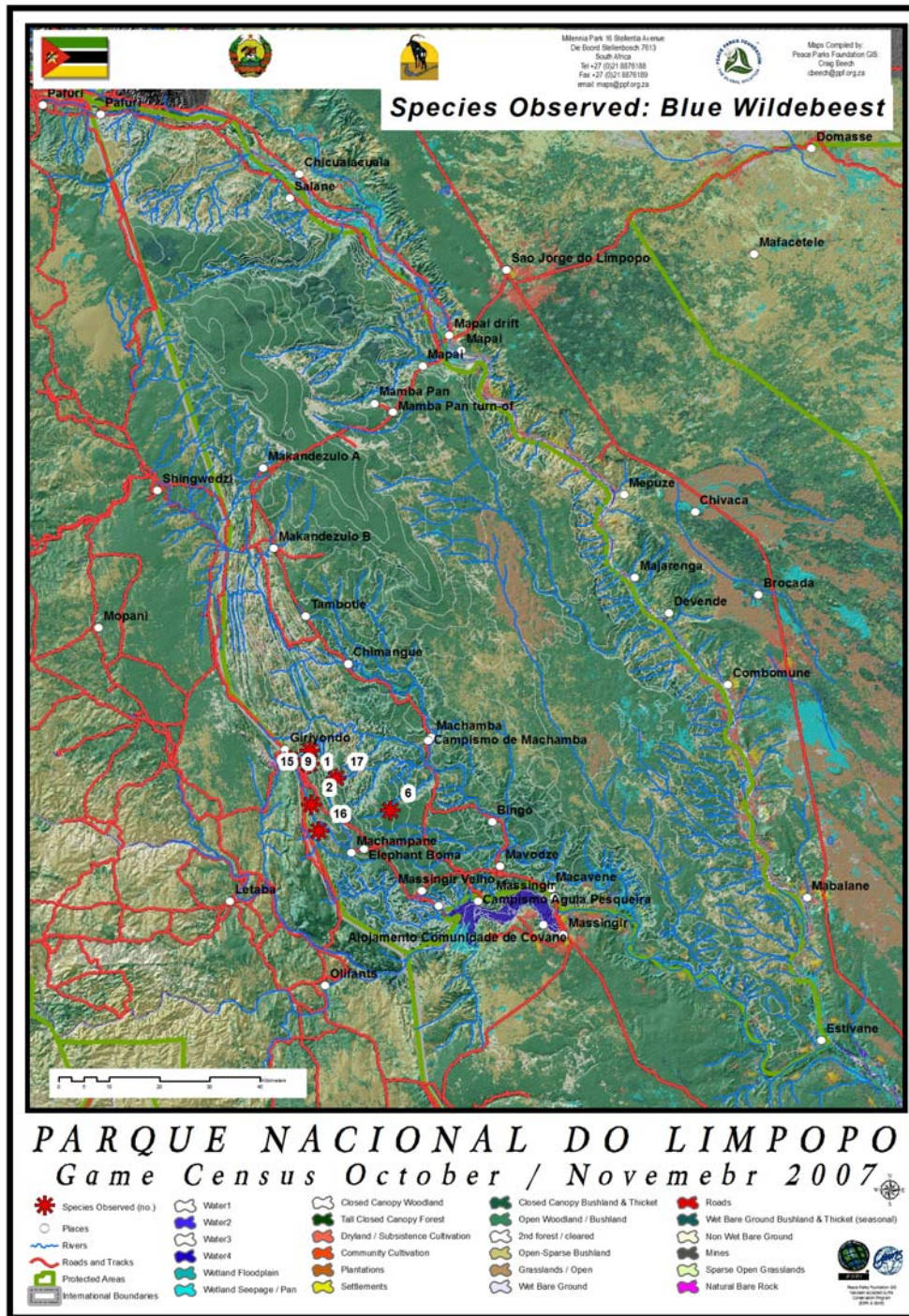
3 RESULTS

Totals for individual species are given in Table 1. and the distribution maps for each species are given in Figures 4 to Figure 29.

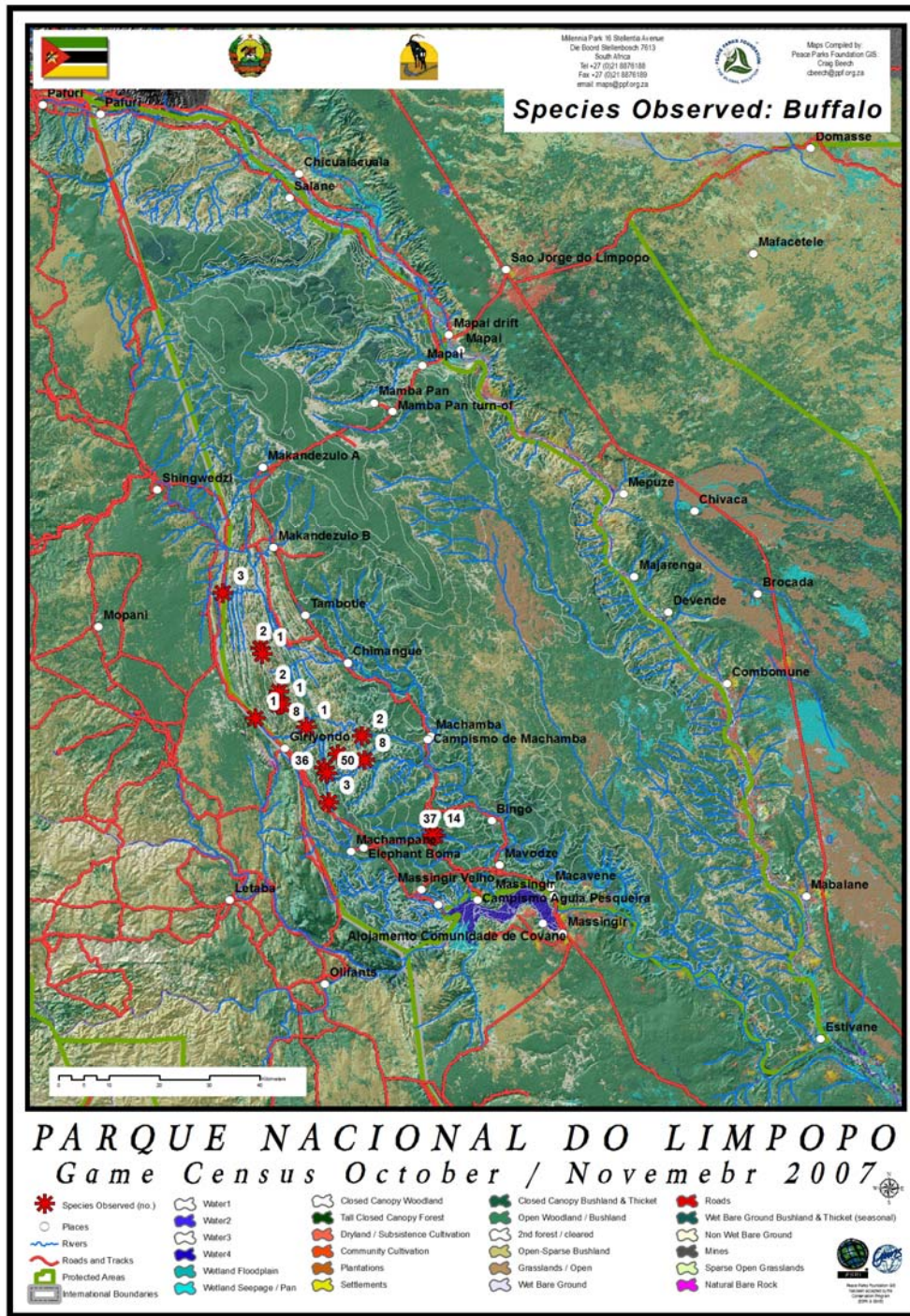
SPECIES	COUNT
Baboon	7groups
Buffalo	189 (+15)
Bushbuck	2
Bushpig	0
Elephants	297
Giraffe	11
Grey Duiker	14
Ground Hornbill	20 (5groups)
Impala	143
Kudu	183
Lichtenstein's Hartebeest	0
Nyala	215
Ostrich	94
Roan	5
Sable	30
Steenbuck	2
Warthog	1
Waterbuck	44
White rhino	0
Wildebeest	66
Zebra	194
Cattle	5320
Goats	Not counted
Crocodile	2



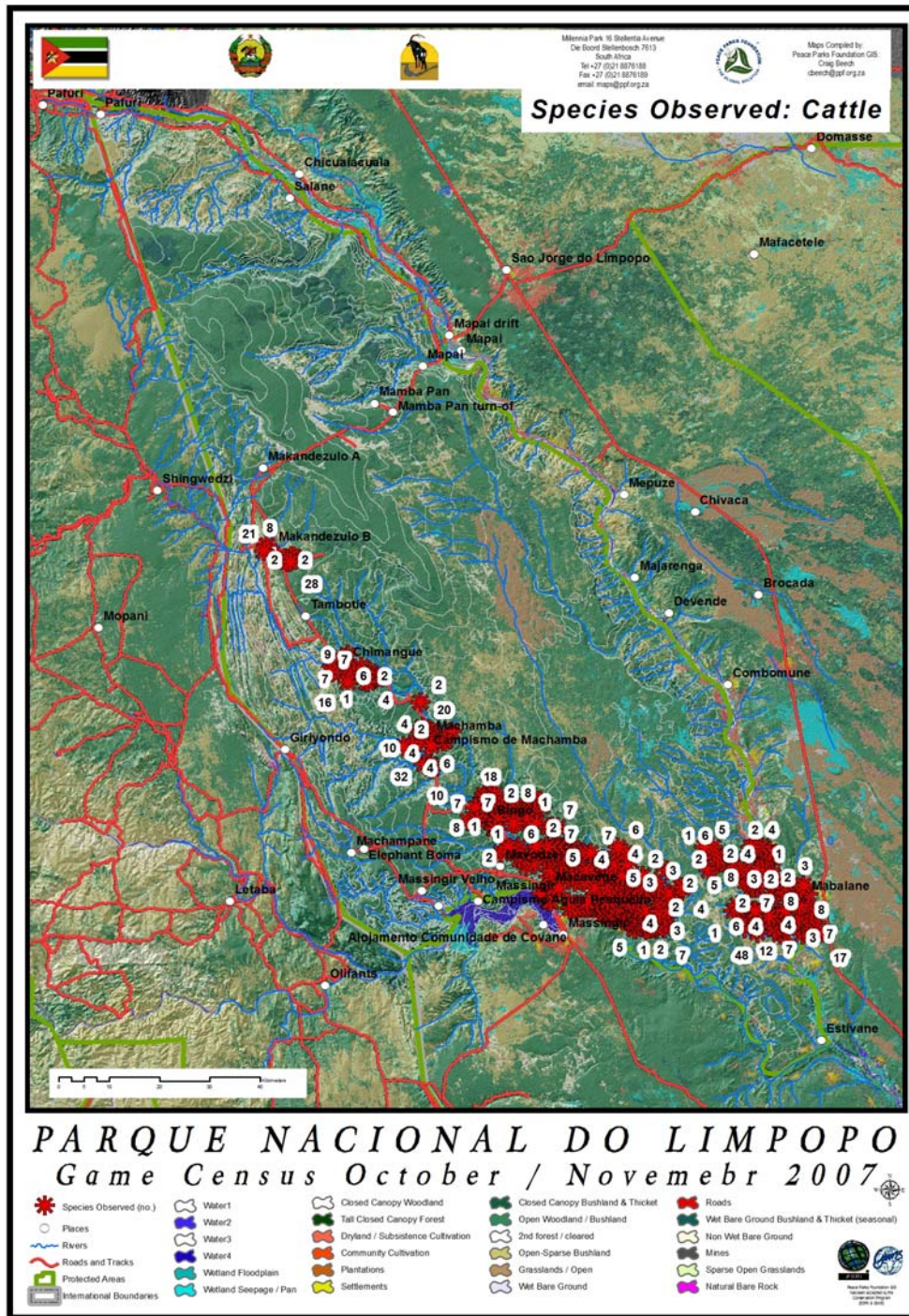
Map 2: Baboon troops were recorded and individuals were not counted. The baboon troops were all recorded well away from human habitation.



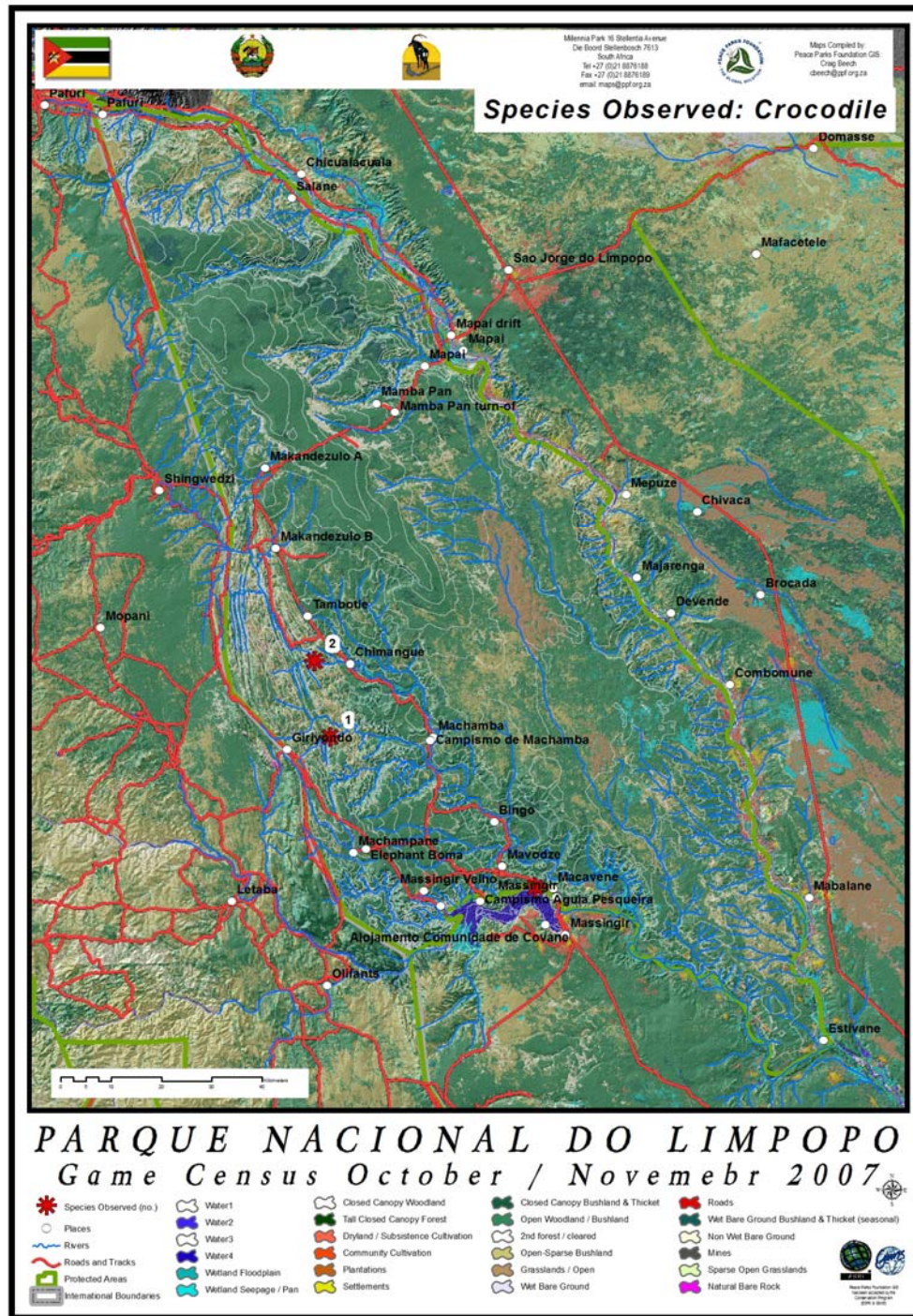
Map 3: Blue wildebeest distribution within the park was similar to that recorded in the 2006 census. The bulk of the wildebeest counted in 2006 were encountered in the "sanctuary", south of the area that was reached prior to the aeroplane problems in the 2007 census.



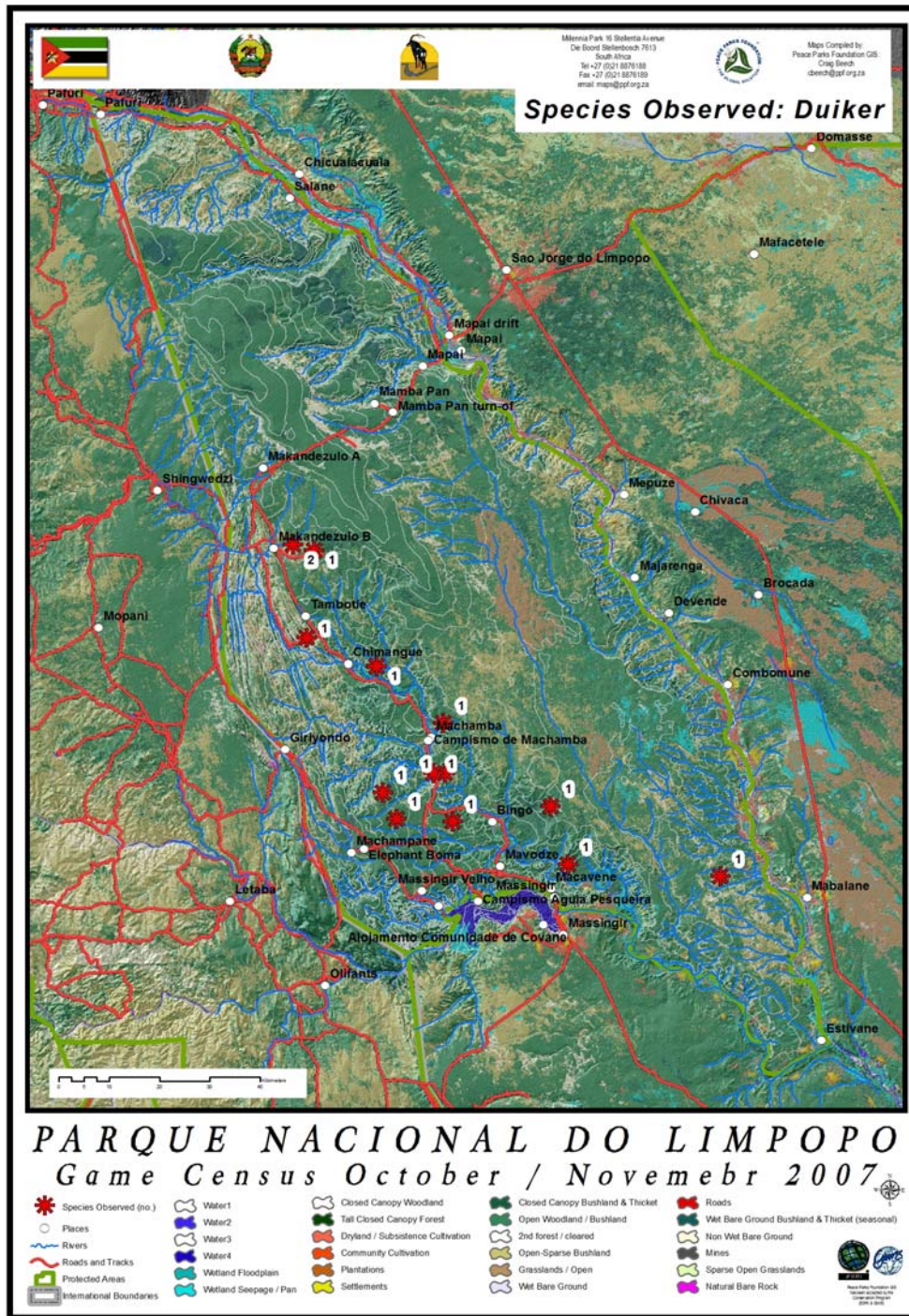
Map 4: The distribution of buffalo was largely the same as in 2006. In the area not counted in 2006, 15 buffalo were counted but not recorded due to equipment failure.



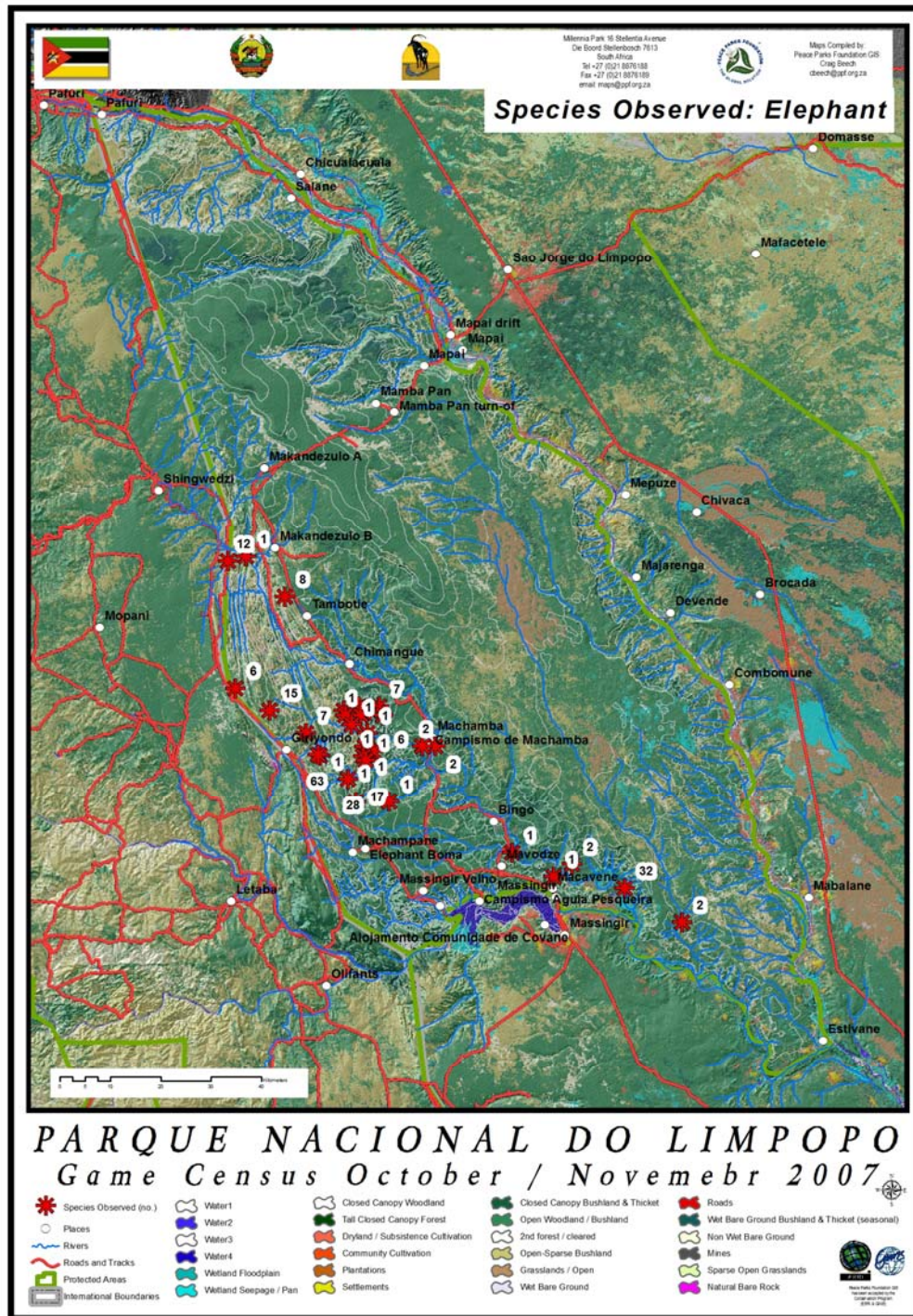
Map 5: Cattle were recorded near all settlements. The data lost at the beginning of the count consisted primarily of cattle sightings



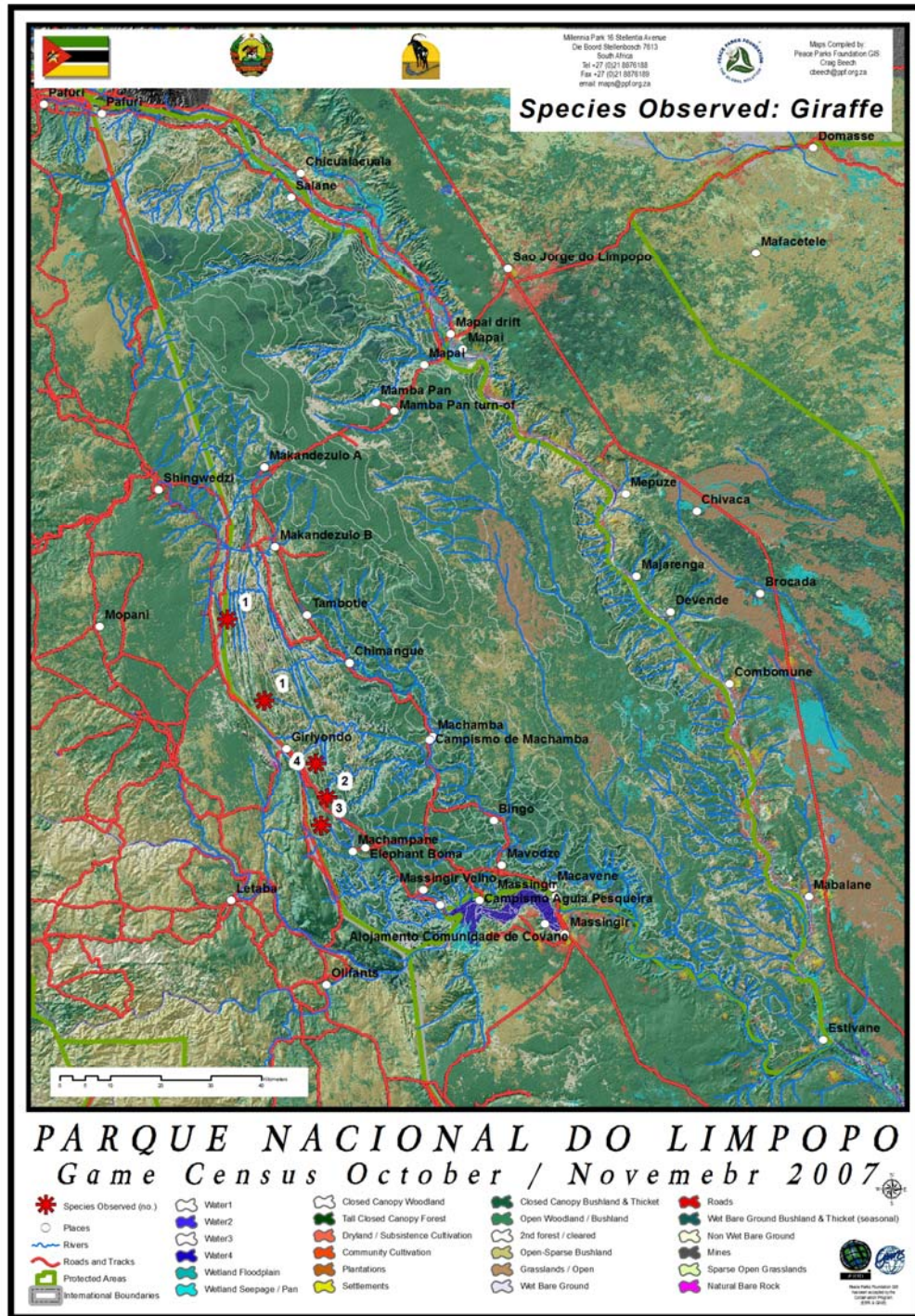
Map 6: The crocodile observations were similar to the distribution recorded in the 2006 census. One observation in 2007 was from the Madonse catchment area, and the other from the upper Shingwedzi catchment area.



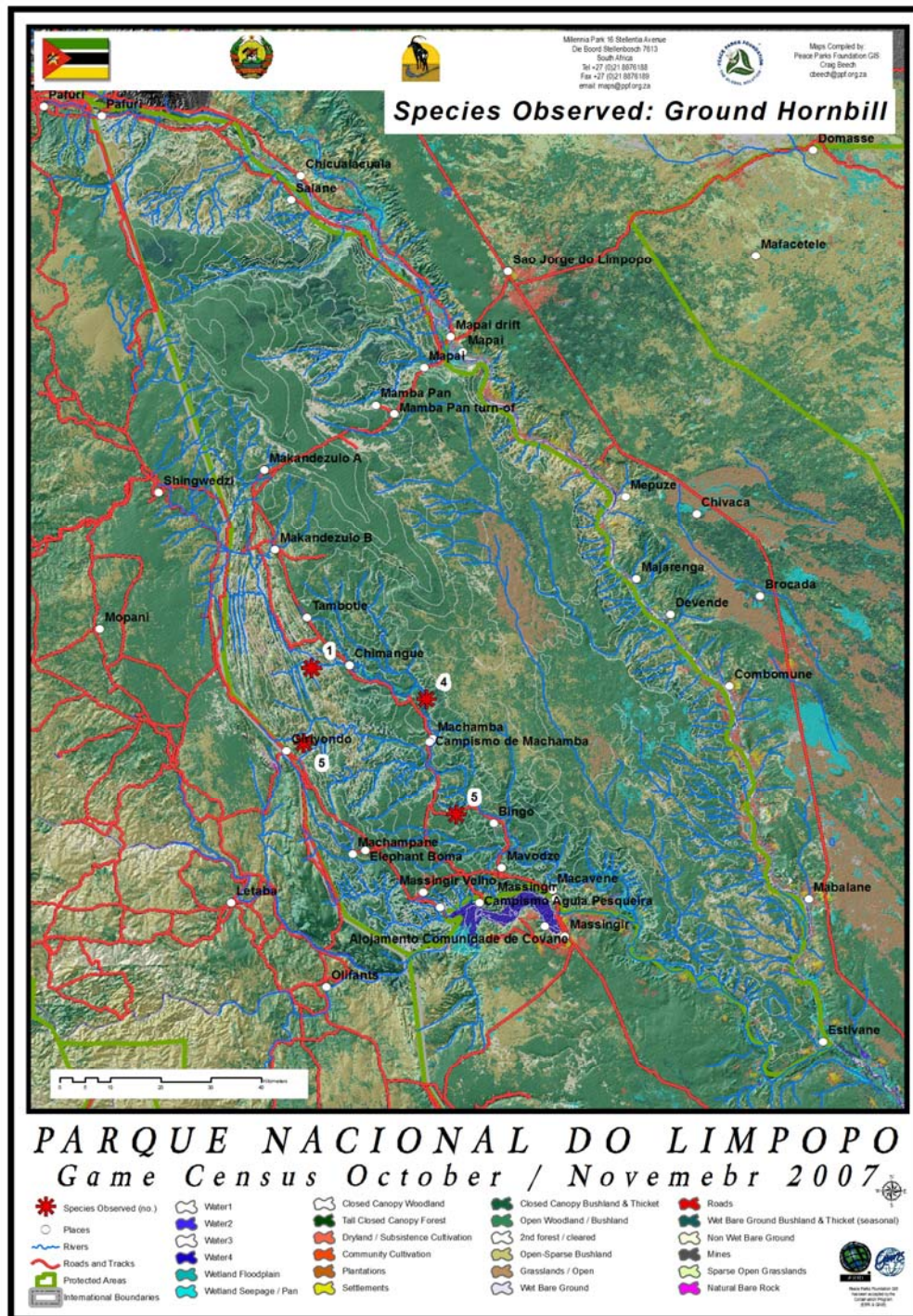
Map 7: Duiker occur in a variety of veldtypes throughout the park, and are not easily observed from aircraft



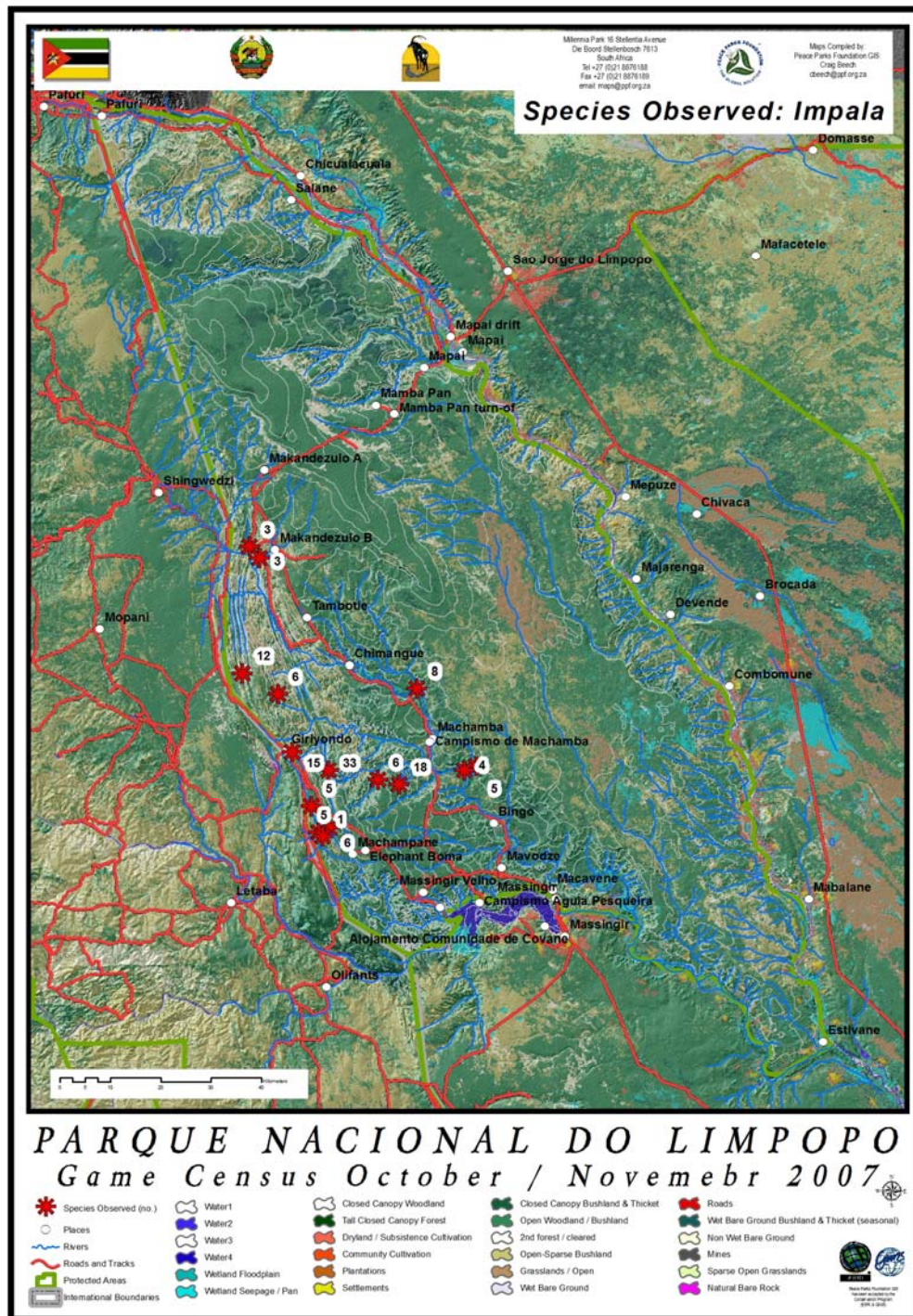
Map 8: Elephant distribution was similar to the previous year. In the area not counted during the 2006 census, elephant are clearly associated with the river. Animals counted but not recorded were also observed close to the Limpopo river, south west of Mabalane. The fact that 333 less elephant than the 2006 census were counted can be largely attributed to the fact that several groups which were counted were not recorded, as well as the large area not counted due to aircraft problems.



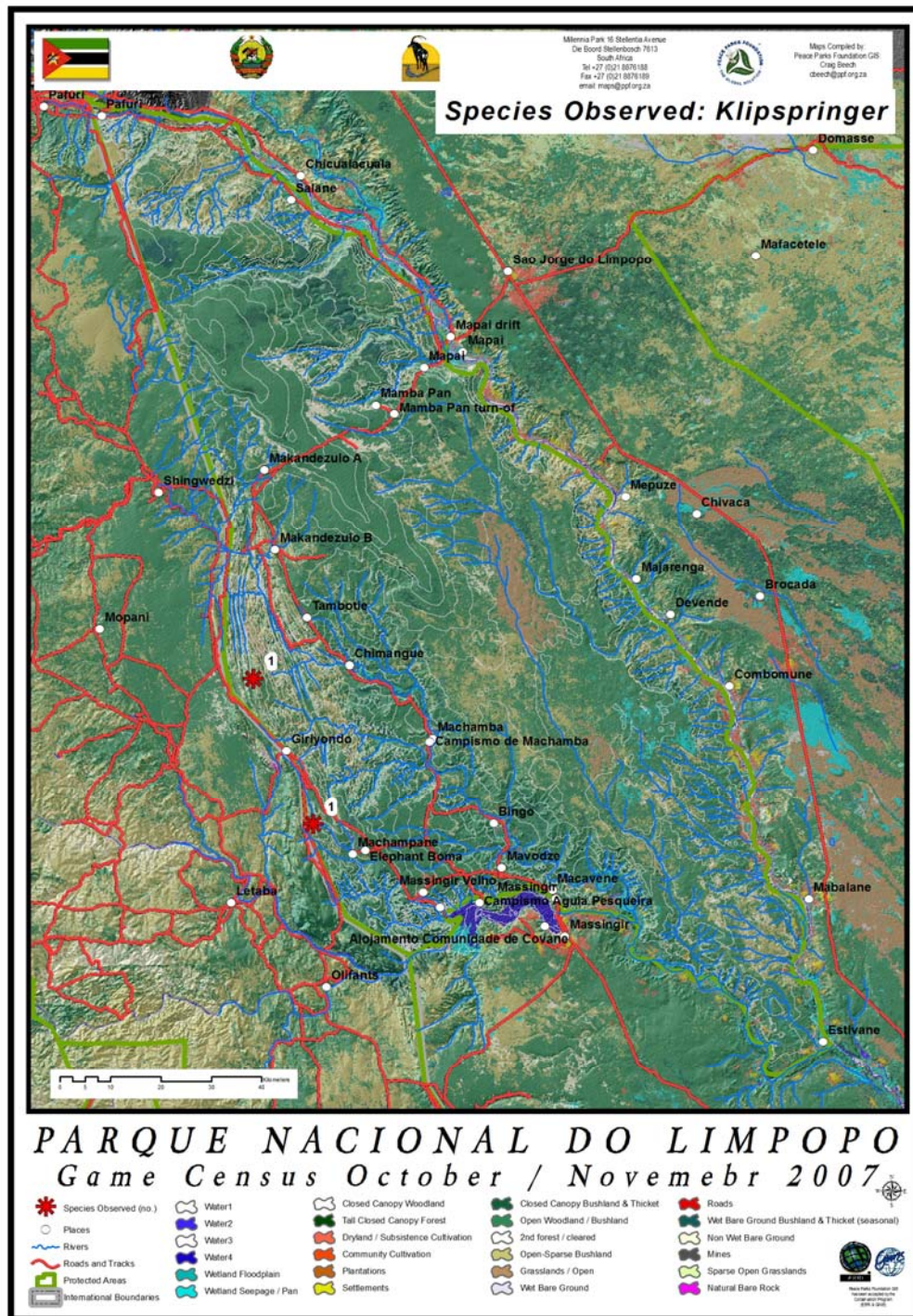
Map 9: Giraffe were recorded mainly close to the Kruger National Park border. Giraffe have been introduced to this area from the KNP.



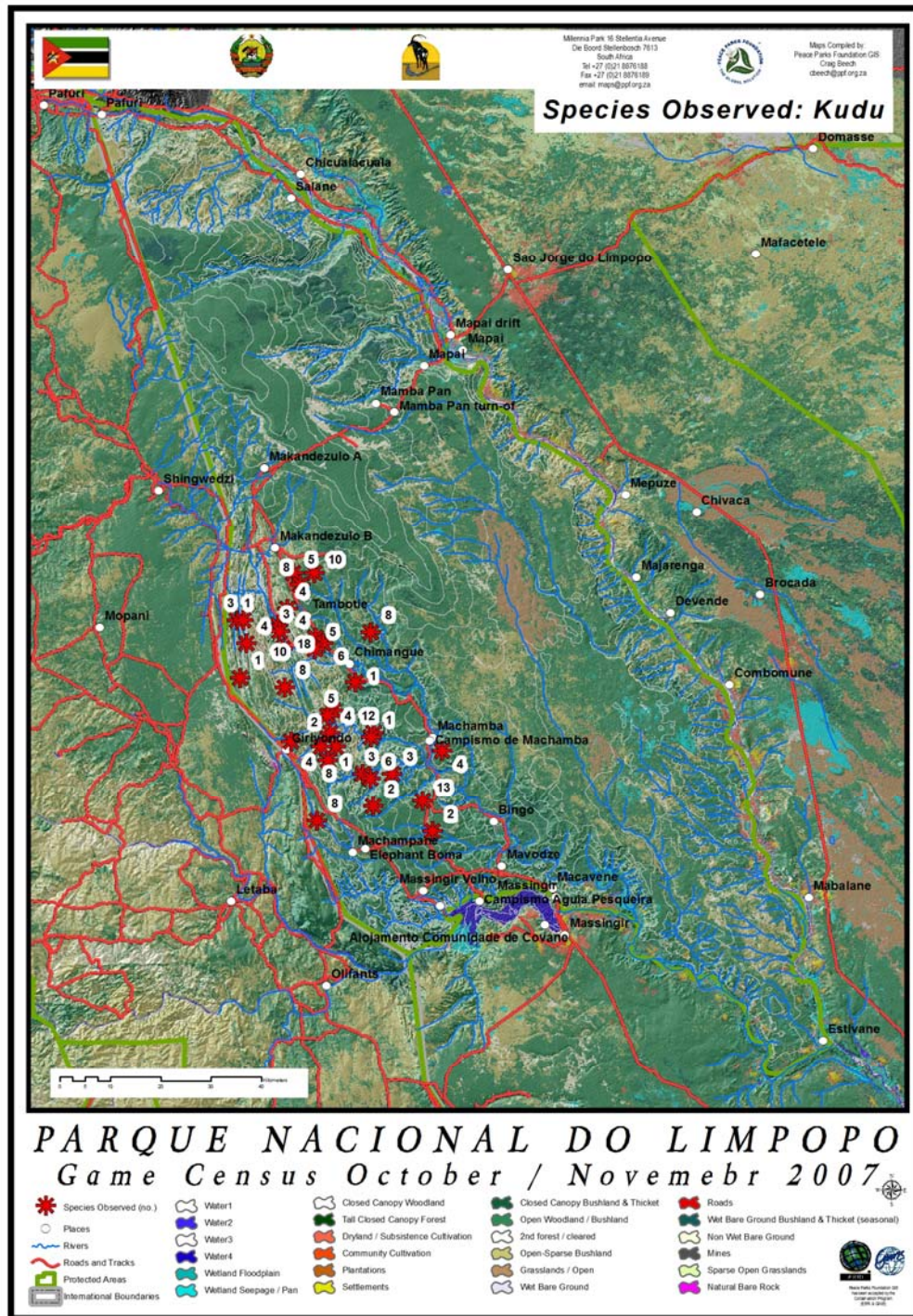
Map 10: Five groups of Ground hornbill were recorded, with an average of four individuals per group.



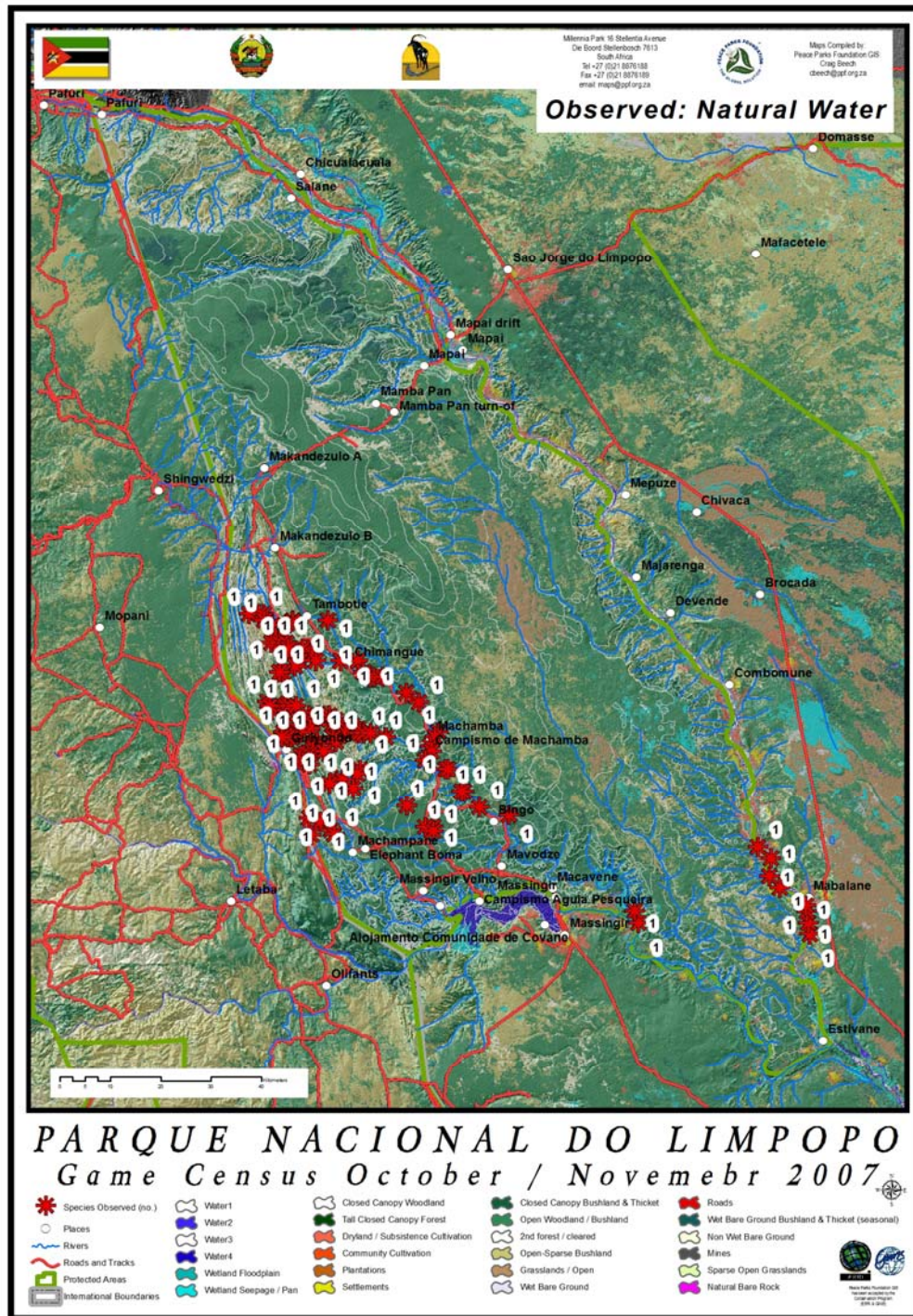
Map 11: Impala are notoriously difficult to count from aircraft. The fact that only 143 were counted can probably be attributed to the large area that was not surveyed, as well as the fact that the 2007 survey was done with only two observers.



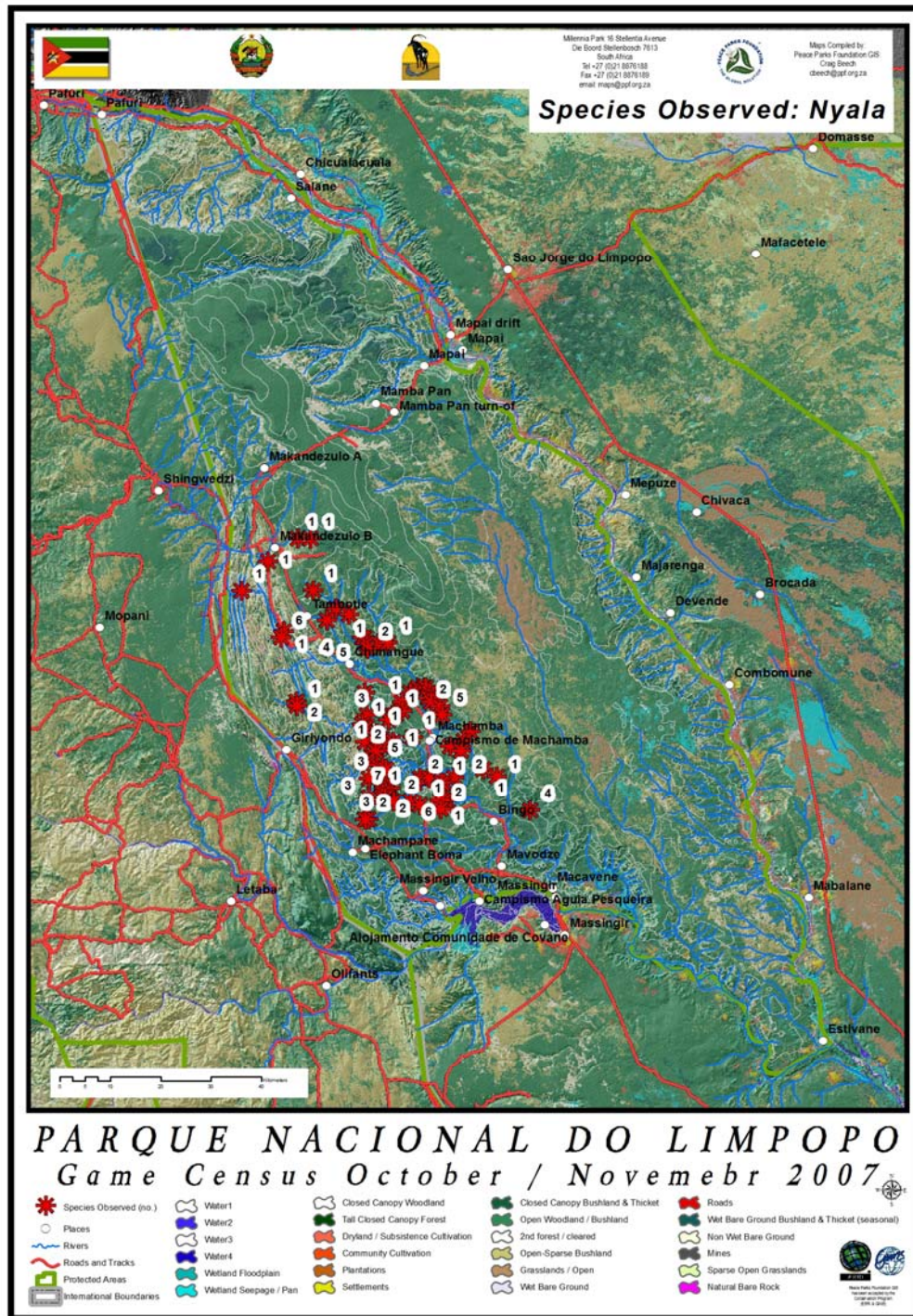
Map 12: Klipspringer were recorded in two locations in the Lebombo mountains, in typical habitat for this species.



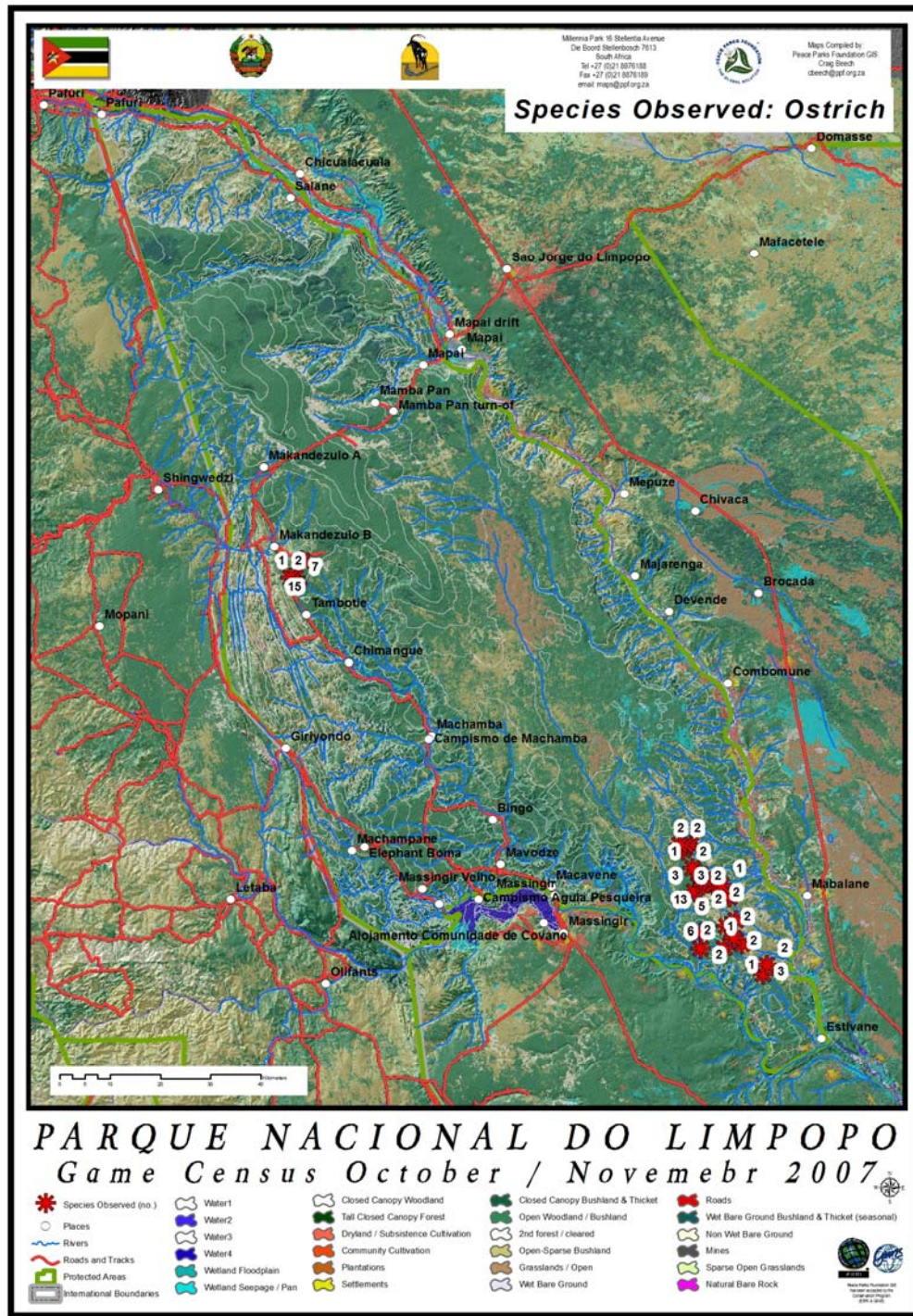
Map 13: Kudu were recorded in the Shingwedzi basin, but were not seen in the area south and east of Massingir. Kudu were not introduced into the PNL, but are well represented throughout the reserve. The map indicates sightings near human habitation, indicating their ability to survive in areas occupied or used by humans.



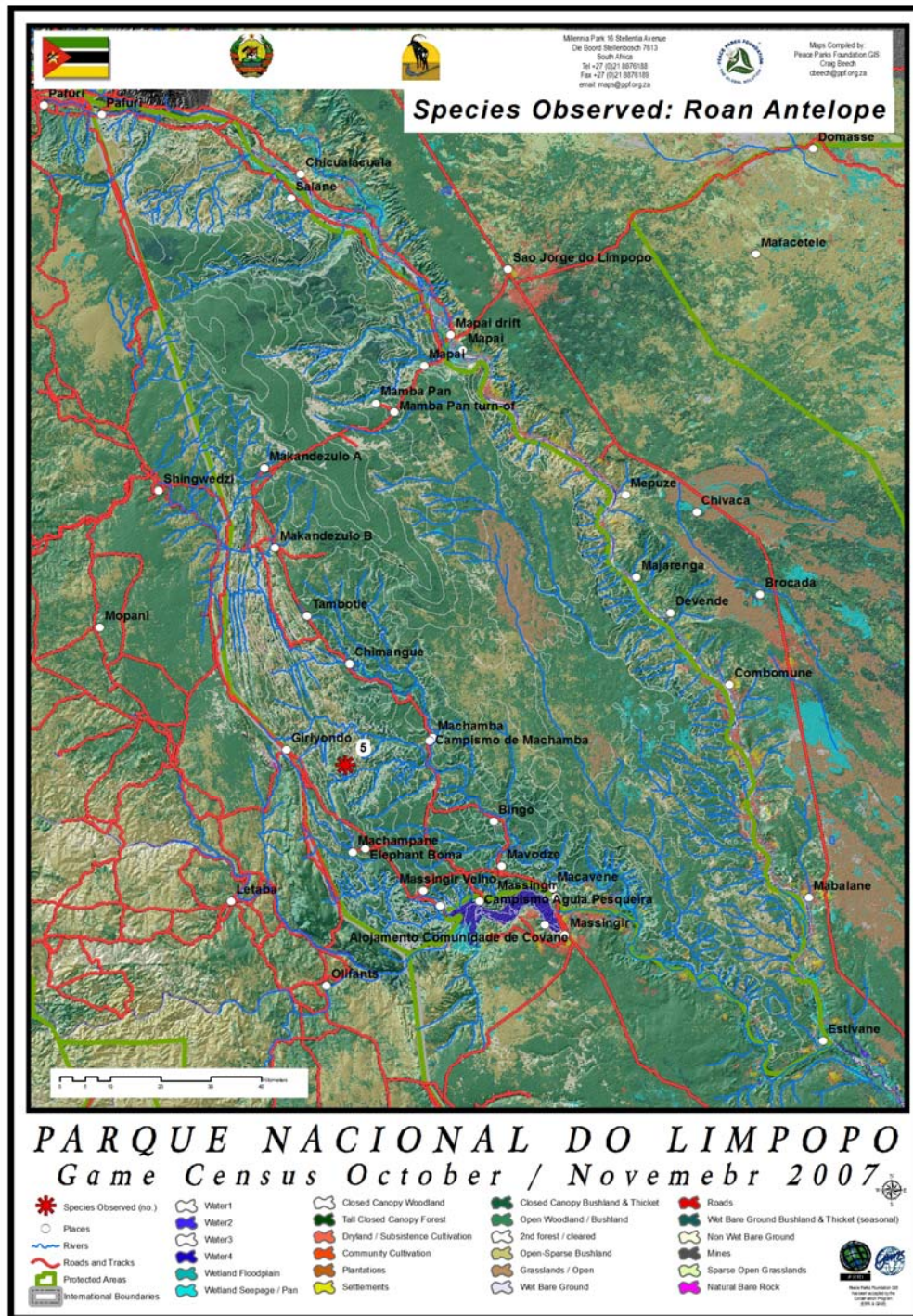
Map 14: Natural water was recorded as it has an important influence on animal distribution. Of interest is the fact that in the south eastern triangle, very little plains game was recorded. The interior of this area is devoid of surface water, with the two rivers, with their associated human settlements, being the only water indicated.



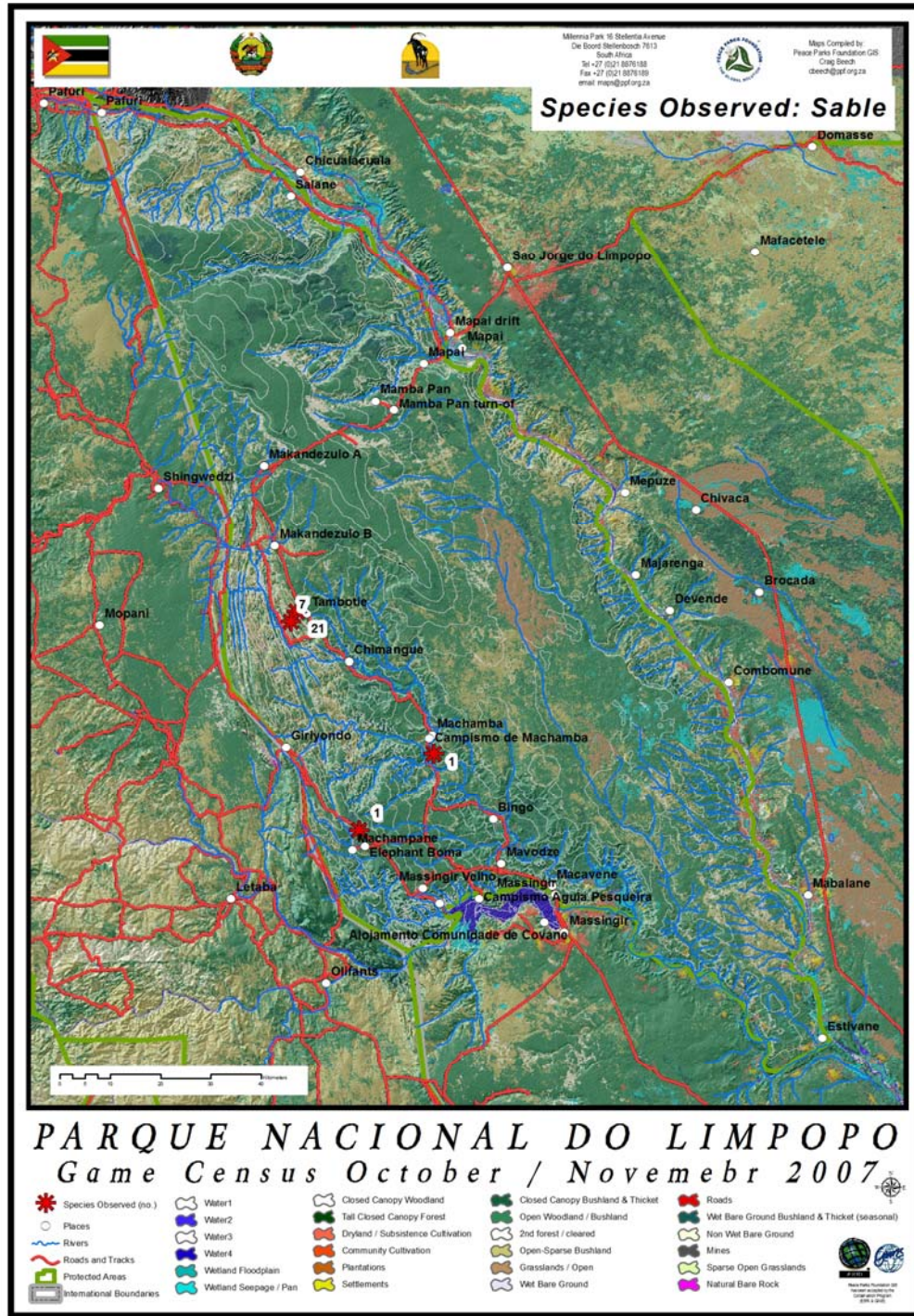
Map 15: The distribution of Nyala was consistent with the previous year's survey. Two Nyala bulls were counted in the south eastern triangle, but not recorded by the computer. No Nyala have been introduced to the PNL. They are well represented in throughout the whole reserve, often in close proximity to human activity and habitation.



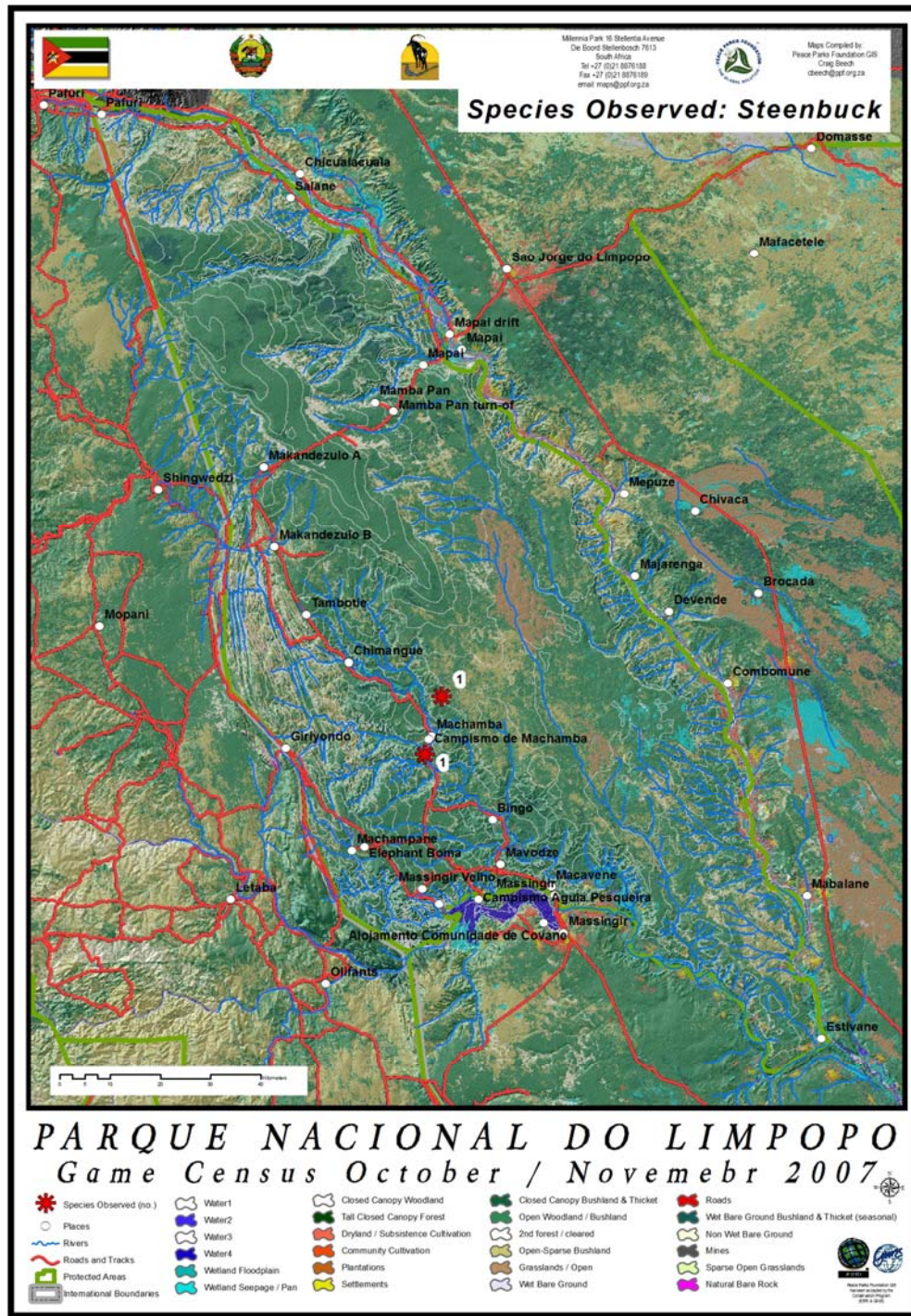
Map 16: Ostriches were recorded in two distinct areas, namely the Makandazulo area in the north western section of the survey area, and the south eastern triangle. The population in the latter area, which was not counted in 2007, seems to be very healthy.



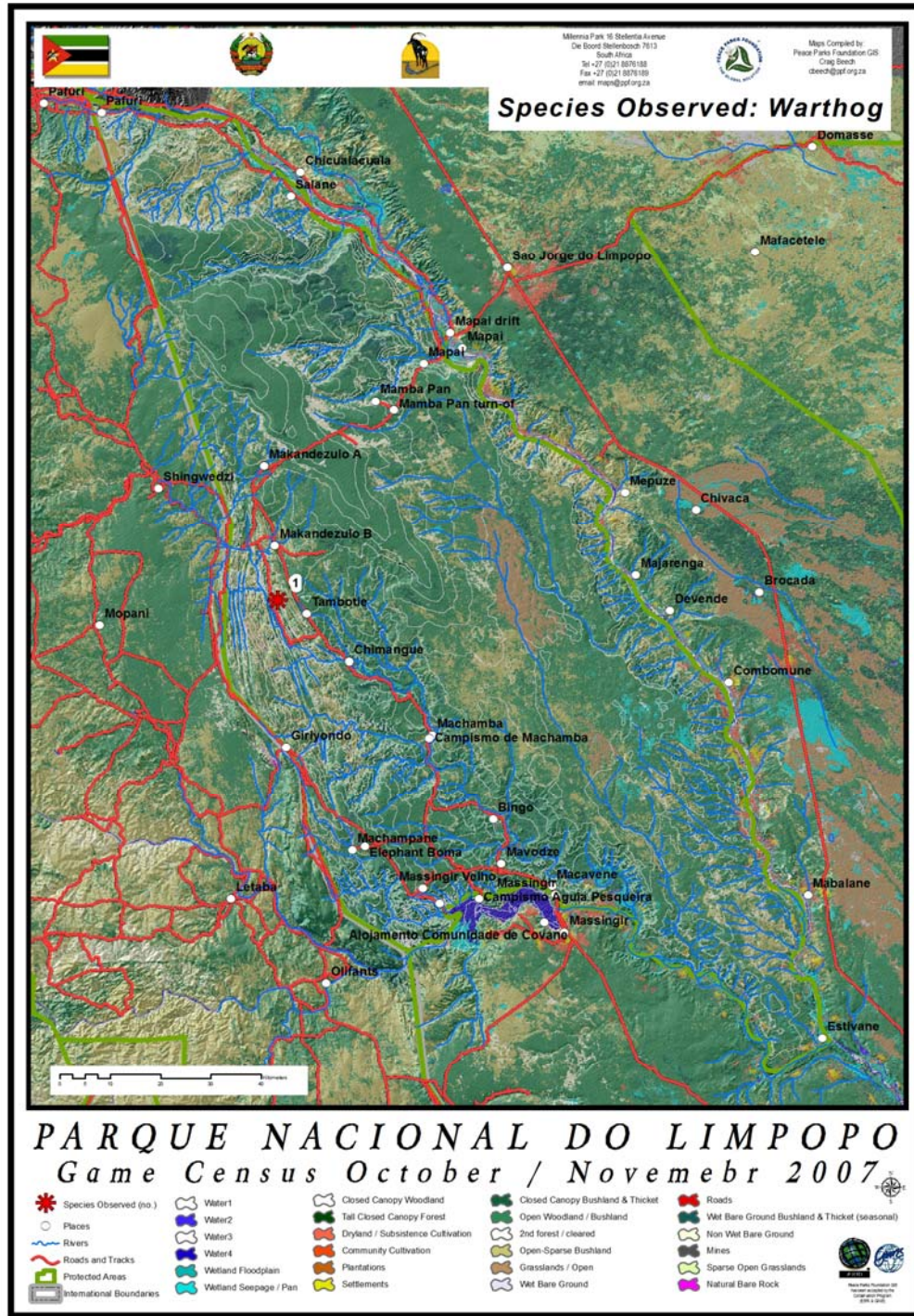
Map17 The Roan Antelope counted were in a single group. The distribution is very similar to the 2006 survey, indicating that the roan seem to have settled in the area where they were counted.



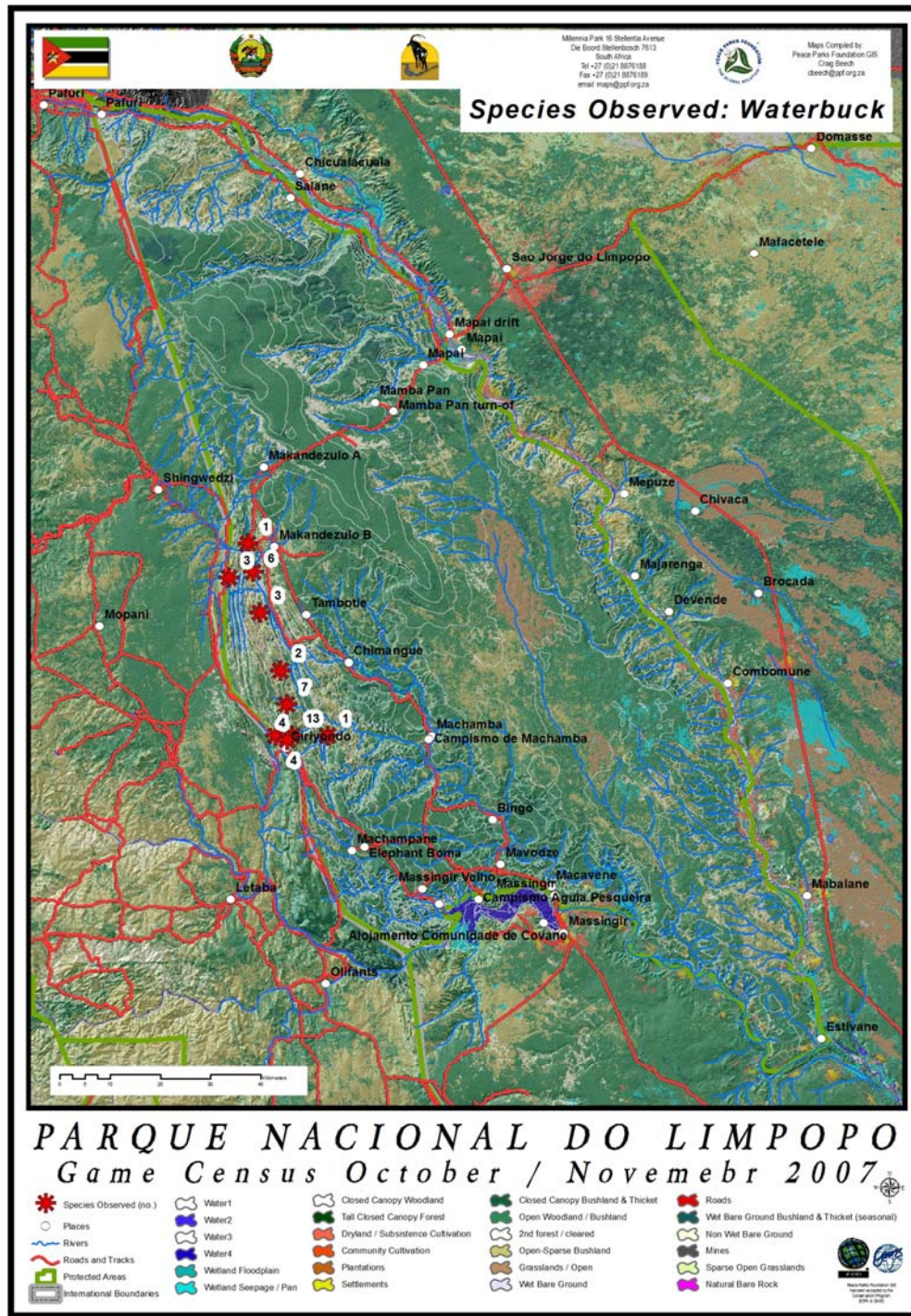
Map18 Sable were counted in four groups. Two of these sightings were singletons. The southern herd was not encountered due to the aircraft problems. This shortcoming was critical to the overall success of the survey, due to the status of this herd, and of sable in the park, being one of the priorities of the survey



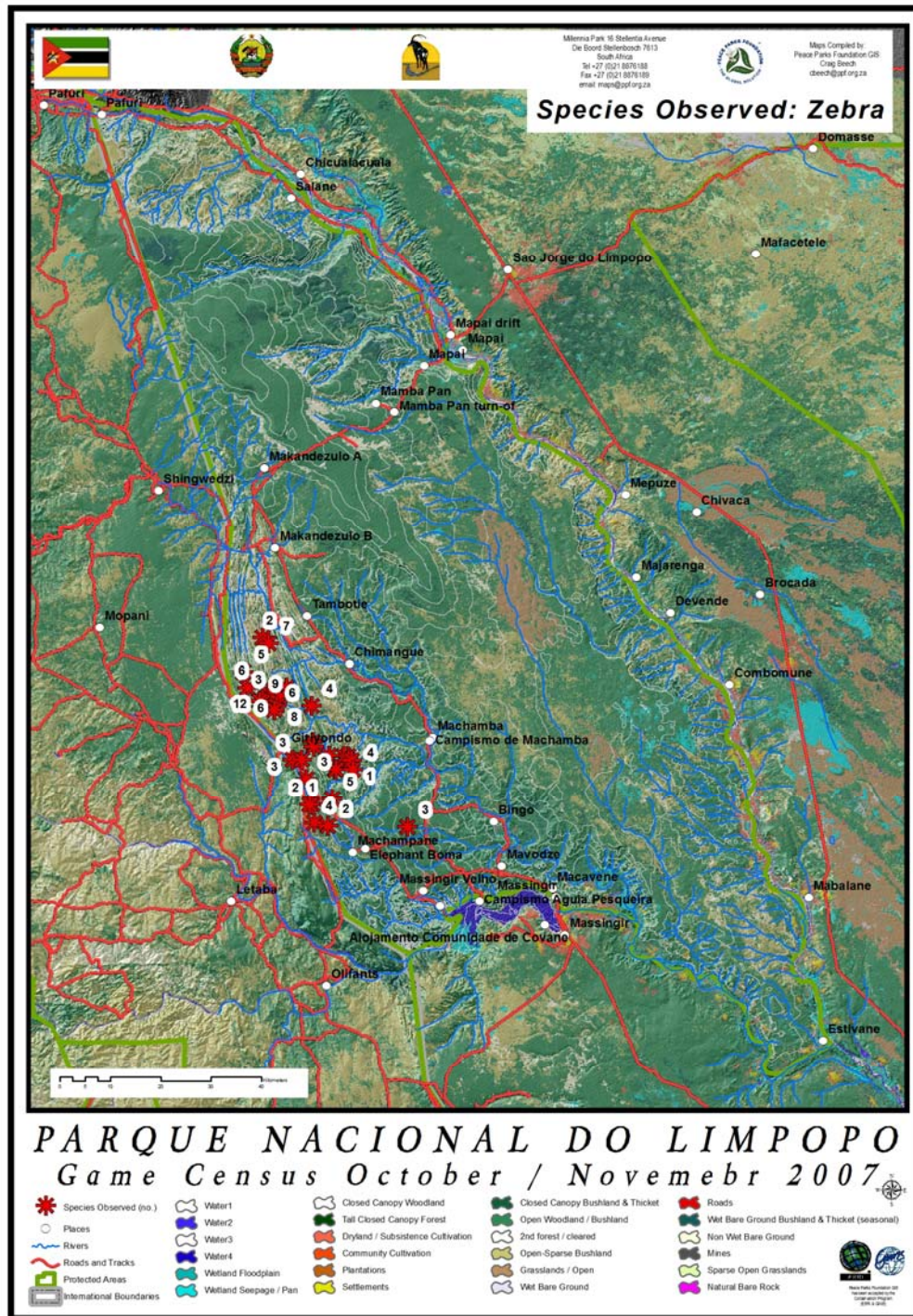
Map 19: Steenbuck are well represented throughout the park, but are not easy to count from the air. The low count is not an indication of the status of these antelope in the park.



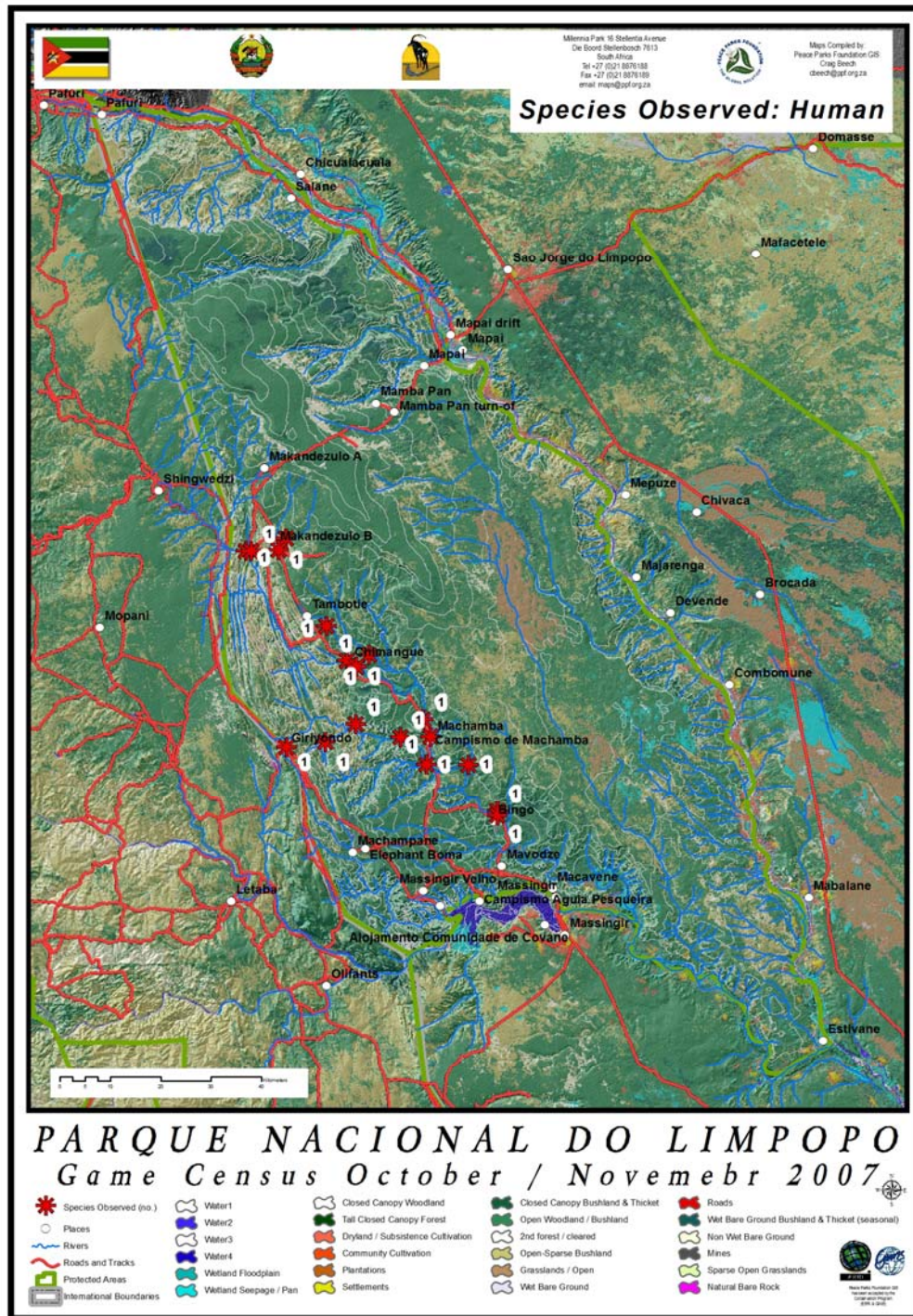
Map 20: Only a single warthog was counted during the survey. The 2006 survey recorded 48 warthog in 17 groups.



Map 21: Waterbuck have been introduced to the park in small numbers. There was, however, a resident population which had survived in the Lebombo mountain range. No waterbuck were recorded east of the Lebombos during the 2007 survey.



Map 22: The distribution of Zebra was similar to the 2006 survey, with no new areas appearing to be colonised. Large portions of the known area inhabited by zebra were not counted due to aircraft problems.



Map 23: Human activity and presence have a marked influence on game distribution. The presence of human activity can clearly be seen concentrated along the Shingwedzi. The lack of signs along the two major river systems is due to the failure of the count equipment to record the information.

4 ACKNOWLEDGEMENTS

Limpopo National Park would like to thank the following people for their contribution to this census:

- Obert Mathebula for his professionalism in maintaining the aircraft during the survey, as well as handling the teams baggage between camps.
- Liezl van Lingen, Stephan Bezuidenhout and Trust Maphote for stepping in at short notice to assist with the count.
- Michele Hofmeyr for arranging accommodation and sorting out other logistics before and during the survey.
- Dr Ian Whyte for his assistance and patience, as well as the use of his 2006 report as a template.
- Craig Beech of the Peace parks Foundation for stepping in at the eleventh hour and creating the long awaited maps.

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