Report on a mountain zebra aerial survey in the Naukluft and Khomas Hochland, 19 to 24 June 2013

An aerial survey specifically aimed at mountain zebra (*Equus zebra hartmannae*) was carried out by the survey unit of the Ministry of Environment and Tourism from 19 to 24 June 2013. The survey covered the Naukluft Mountains in the Namib-Naukluft Park and a large area of the Khomas Hochland west of Windhoek, between the Swakop River in the north and the Naukluft Mountains in the south (Figure 1). The survey was carried out using a Bell Jet Ranger 206 helicopter (V5-HIR) with a crew of four using standard aerial survey methodology. The flight path and sightings were recorded on a GPS and Jolly's method 2 was used to derive population estimates. Maps were generated using ArcView software.

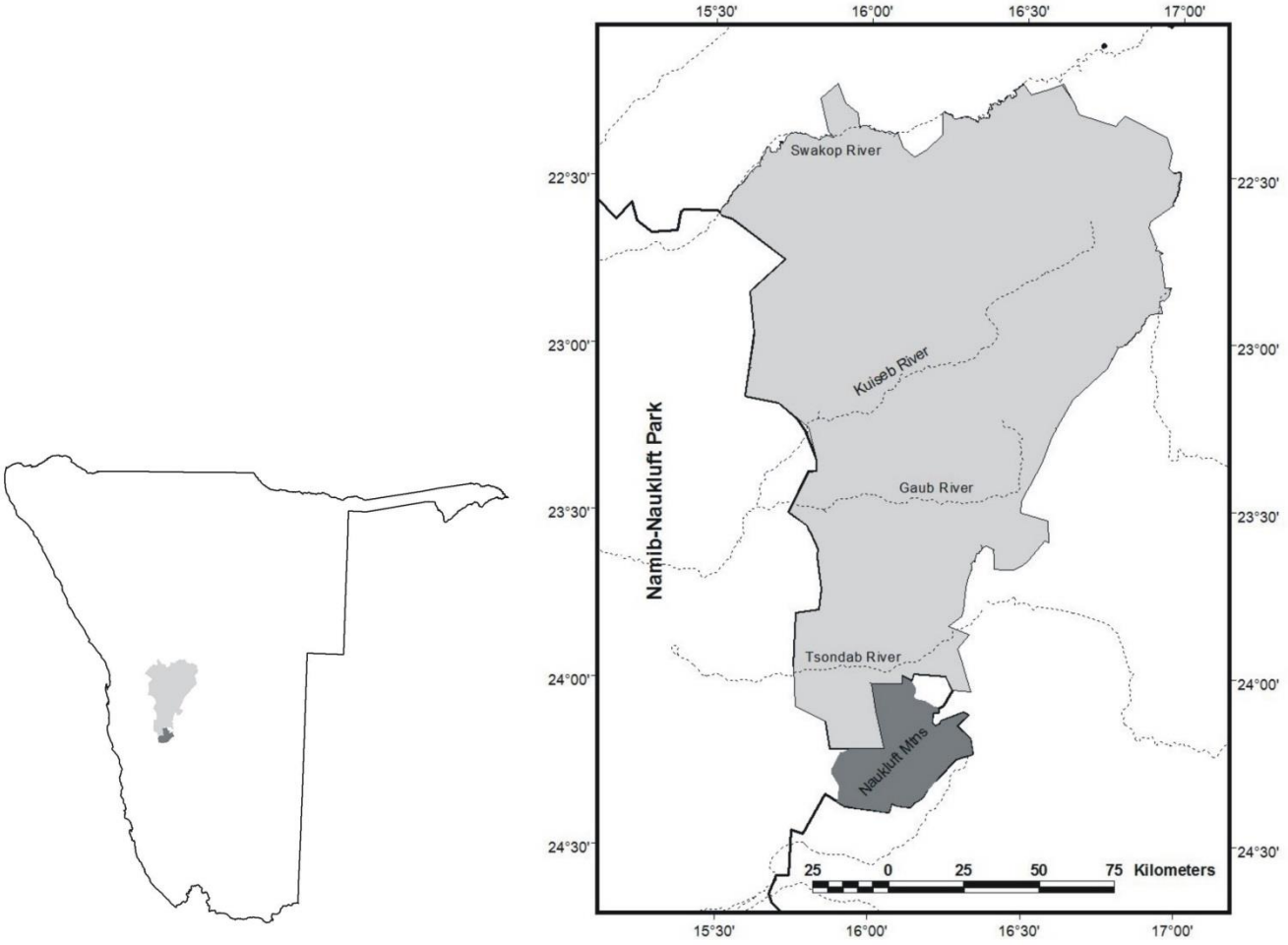

Figure 1: Location of the survey areas.

Table 1: Details about the survey areas.

Name	Area (km²)	Area covered (km²)	% covered
Naukluft	1148	432	37.6
Khomas Hochland	18932	2839	15.0
Total	20080	3271	16.3

The Naukluft Mountains inside the park between the two main roads (Solitaire to Sesriem and Solitaire to Büllspoort) were divided into 68 blocks of 5X5km (or fractions thereof, depending on the boundary) and then a random number table was used to select blocks until approximately 40% of the area was covered. Figure 2 shows the Naukluft survey blocks and the actual flight path covering the selected blocks.

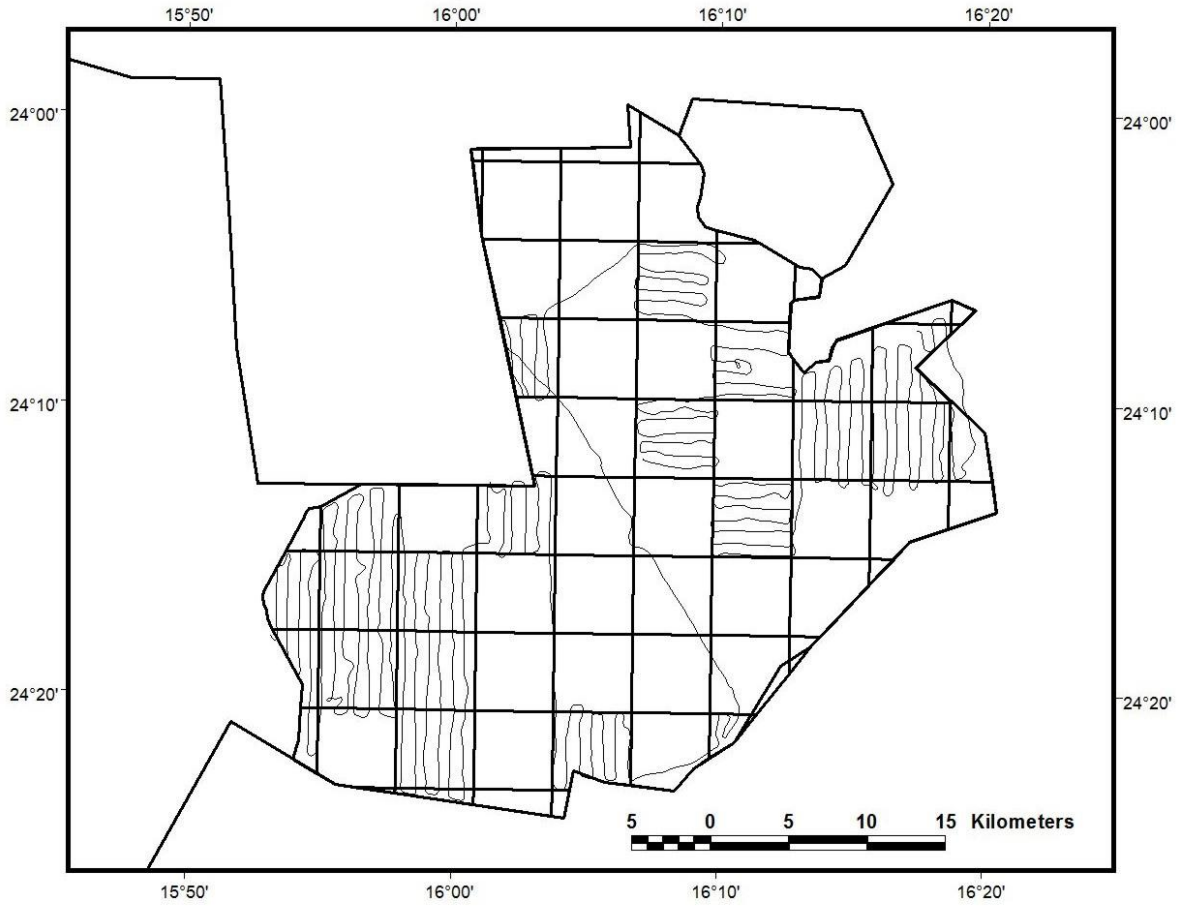

Figure 2: Survey blocks in the Naukluft and actual flight path for the blocks covered.

Information on utilisation of mountain zebras from the MET Permit Office was used to delimit the area to be covered in the Khomas Hochland. The area was extended in the west up to the Namib-Naukluft Park boundary because it can be assumed that there is considerable movement of zebras between the park and the adjacent land. Transects spaced at 5km were laid out in an east-west direction and Figure 3 shows the actual flight path covering the Khomas Hochland survey area.

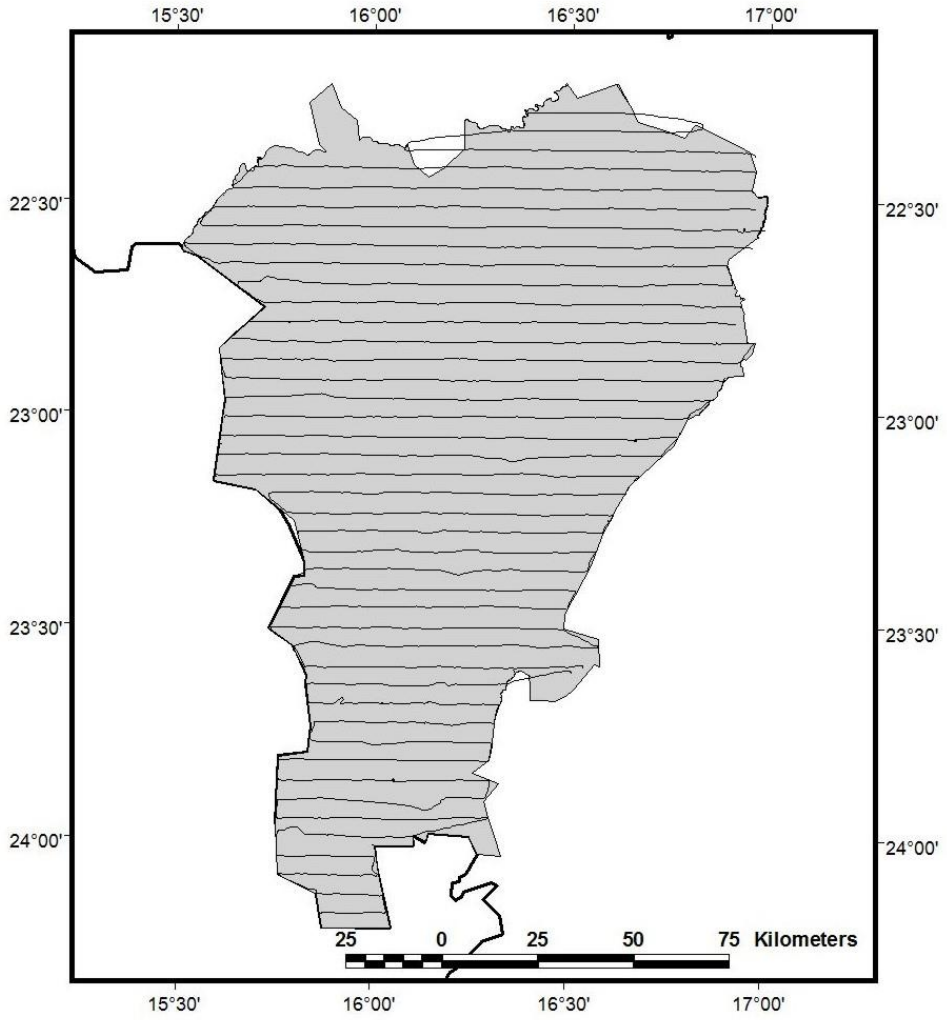

Figure 3: Actual flight path covering the Khomas Hochland survey area.

Results:
A total of 894 sightings comprising 5811 animals were recorded. Population estimates give a number of 2643 animals for the Naukluft and 27082 for the Khomas Hochland (Table 2). Average herd size for the Naukluft was 7.10 individuals with a maximum of 55 whereas in the Khomas Hochland the average was 6.35 individuals with a maximum of 37 (Table 3). Figures 4 and 5 show the distribution of the sightings and the herd size observed.

Table 2: Population estimate details for the two areas surveyed.

	Number seen			Population Estimate					95% CL		Density
Name	**In**	**Out***	**Total**	**Lower**	**Estimate**	**Upper**	**Variance**	**SE**	**+/-**	**%**	**No/km²**
Naukluft	994	292	1286	1703	2643	3583	204222.2	451.9	940	35.56	2.303
Khomas Hochland	4061	464	4525	21042	27082	33122	8932682.4	2988.8	6040	22.30	1.430

* numbers seen during ferry and outside survey blocks

Table 3: Number of sightings, average herd size, standard deviation and maximum herd size observed.

	Naukluft	Khomas Hochland
n	181	713
avg	7.10	6.35
sd	6.05	4.74
max	55	37

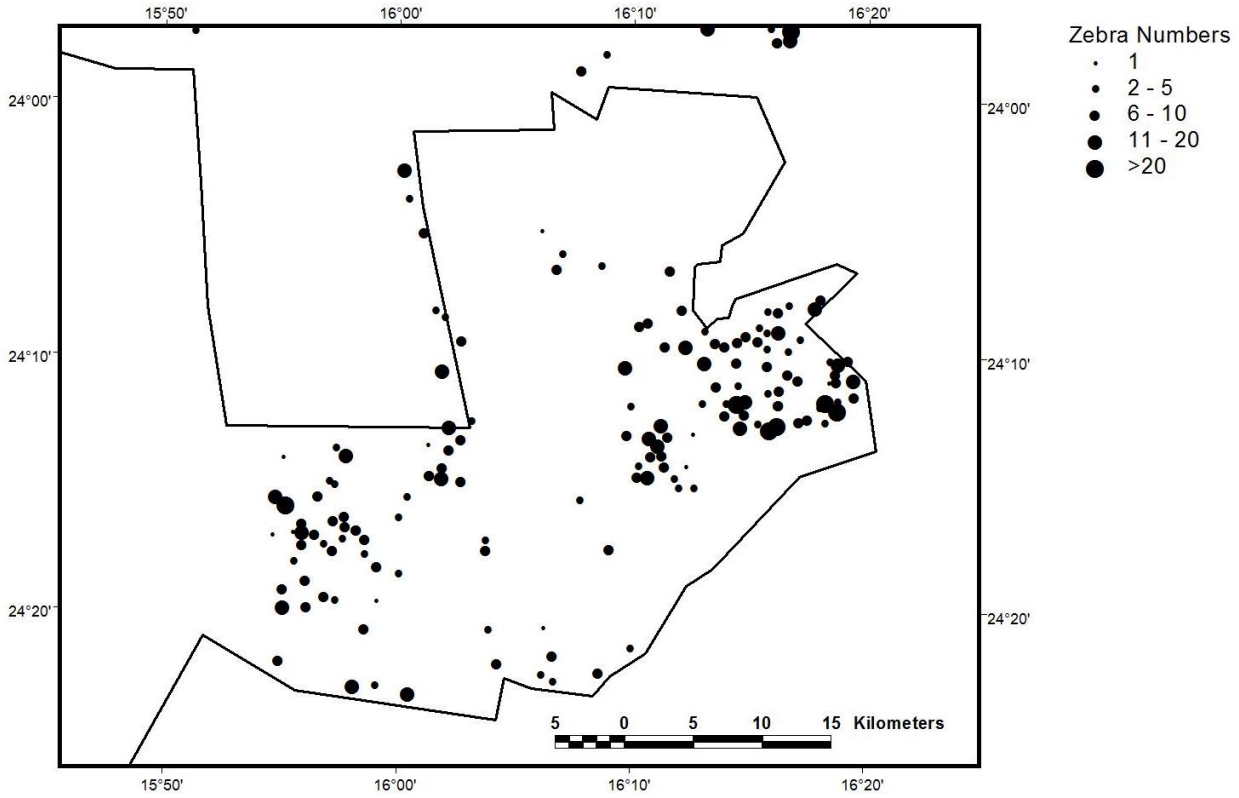

Figure 4: Sightings and herd size in the Naukluft area.

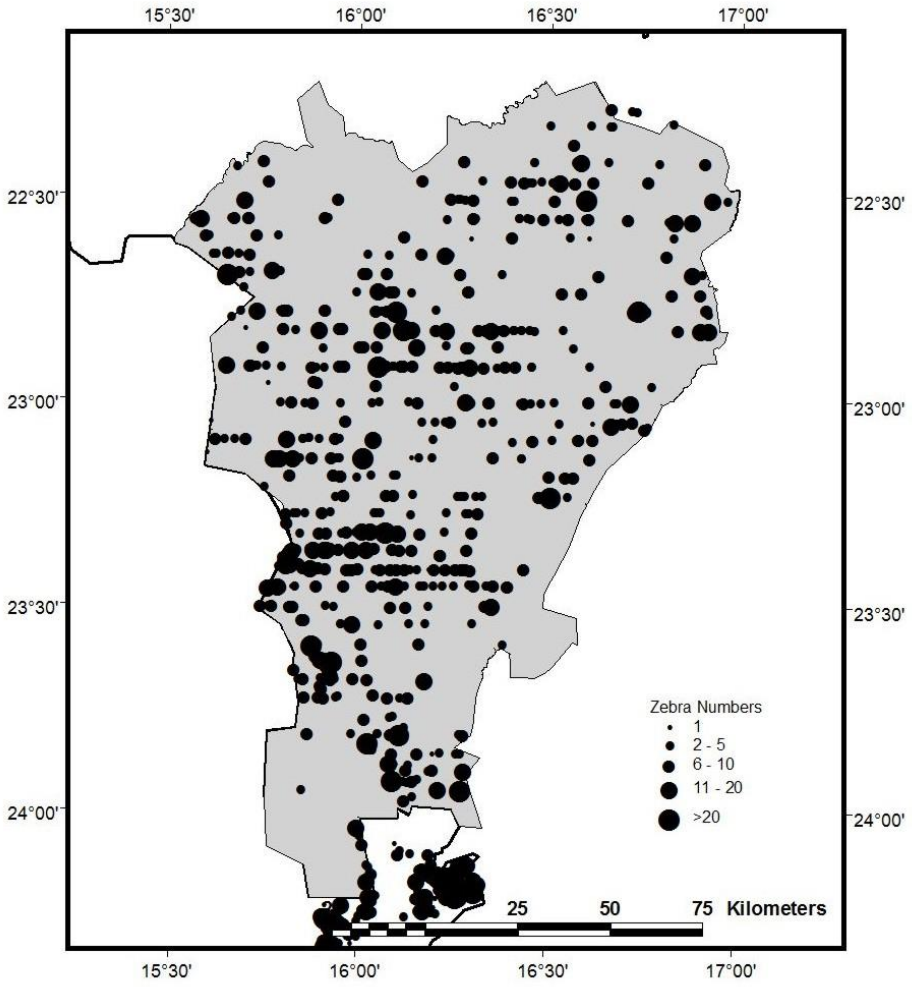

Figure 5: Sightings and herd size in the Khomas Hochland survey area.

Some observations and comments:
The results of this survey should be seen as an absolute minimum population estimate for two reasons. In some places the ruggedness of the terrain made it impossible to fly low and hence many animals will have been missed. Secondly, zebras, when standing still, especially in the shade of a cliff or in a deep ravine, are extremely difficult to spot and some animals may have been missed due to this.

The above shortcoming can be addressed by supplementing the counts with population estimates derived from camera trap studies such as the one currently being carried out in the Naukluft. Camera traps could be set up at a sample of farms and analysed in a similar way and then a correction factor can be applied.

The survey should be expanded, if funds allow for this, to include the Ganab-Gemsbokwater-Kuiseb Canyon area of the Namib-Naukluft Park because this area also holds large numbers of zebras.

Holger Kolberg