



**Results of the  
Annual Game Count  
for the NamibRand Nature Reserve  
and Pro-Namib Conservancy  
1 June 2013**



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## 1. Introduction

This report provides summarised results and analysis of the annual game count held on the NamibRand Nature Reserve and Pro-Namib Conservancy on the 1<sup>st</sup> of June 2013- for the ninth consecutive year since the count was initiated in 2005. This was also the second year running that the farms Springbokvlakte and Saffier were included in the count since they joined to the reserve in 2012.

Teamwork was once again the essence of the day as all concessionaires, landowners, neighbours and NRNR staff joined in to participate in the event. The game count briefing, which included a theoretical presentation, discussions and handing out of game count files to the different teams, was held on the 31<sup>st</sup> of May at the Wolwedans private camp prior to the AGM.

Even though this year's rainfall has been exceptionally low, with an average of  $\pm 30\text{mm}$ , the effects of the last two year's good rainfall can still be seen, as the numbers of the plain's game are still relatively high. The effects of this year's rainfall will probably only be seen next year or the year after.

Kindly note that the game count method employed is ideal for estimating larger numbers of common plains game, but less suited to other species such as kudu and steenbok. No single census method is complete in itself, but needs to be supplemented and complemented on a dynamic basis by local knowledge and other sources of information, e.g. independent total counts of recently re-introduced species, incidental sightings and camera trap recordings.

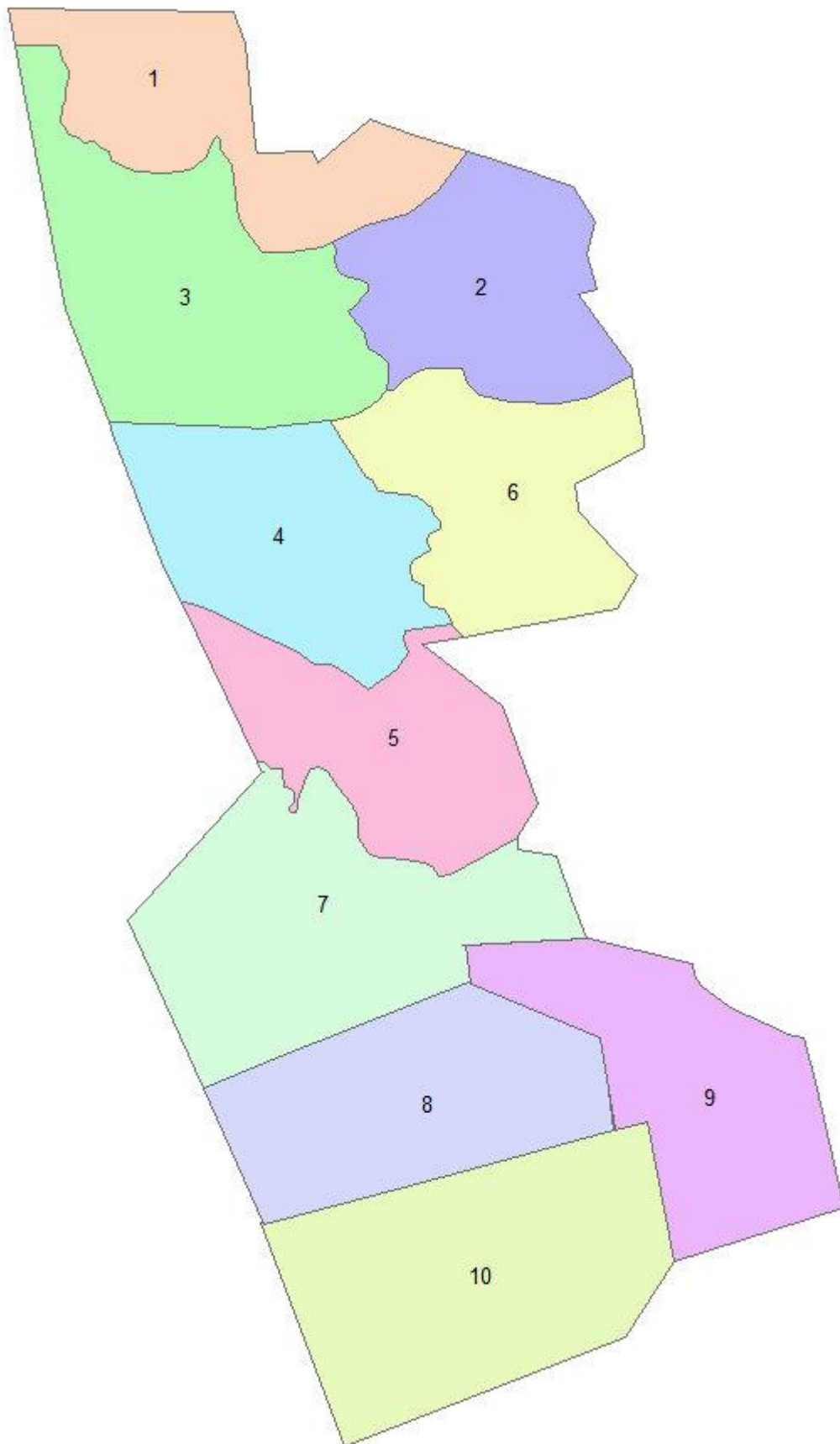
## 2. Methodology

For the purposes of the count, the total area is divided into ten game count zones, each with its own standardized route. The count zones used in 2013 are shown in figure 1. These include two relatively new zones: No 9 that was added to the existing NamibRand zones in June 2009 in order to include the adjoining farms Excelsior and Dina, now part of the total area available to game through the establishment of the Pro-Namib Conservancy; and No. 10, added this year to include the farms Springbokvlakte and Saffier, which joined NamibRand officially in June 2012. The total NamibRand count area (Zone1-8 and Zone 10) is now 177 782 ha.

*Table 1. Total areas for Zones 1-10, size of mountain areas (excluded), and remaining count area (ha)*

Zones		Total area (ha)	Mountains (ha)	Count area (ha)
Zone 1-8	NRNR	172 208.63	179 928.63	154 280.00
Zone 10		30 079.53	6 578.00	23 501.53
<b>TOTAL NRNR AREA</b>		202 288.16	24 506.63	177 781.53
Zone 9 (Dina & Excelsior)		18 155.70	1 705.70	16 450.00
<b>TOTAL COUNT AREA</b>		<b>220 443.86</b>	<b>26 212.33</b>	<b>194 231.53</b>

*Figure 1. The game count area, showing the ten zones used in June 2013 for the NamibRand Nature Reserve (1-8, 10) and the Pro-Namib Conservancy (9)*



### 3. Count Methodology

The basic survey methodology used is a combination of the Distance and the Strip-Count census techniques. In layman's terms, these can be explained as follows:

#### **Distance**

All animals are counted and the distance to each animal, or group of animals, is recorded at right angles to the vehicle. This distance allows us to apply a *species' correction factor* for each type of animal counted. This is done in order to compensate for animals not seen.

For example, the chances of seeing large animals like zebra over a great distance are much higher than the probability or chances of seeing a smaller animal like a steenbok. Therefore a correction factor of 1.2 can be used for zebra (because one is likely to see most of them over a set distance). A much higher correction factor of 10 can be used for steenbok – over the same set distance one is likely to see only a few steenbok while the rest will be hidden by “dead” ground or obstacles.

#### **Strip-Count**

All animals are counted and the distance to each recorded, at right angles to the vehicle. A strip-width is then determined - 1 000m in our case, so that the area covered can then be multiplied into the overall area. This is known as an *area correction factor* (the number of times a 1 000m wide strip will fit into the whole area). Only the animals inside the 1000m area (500m on either side of the road) are multiplied by the correction factor, in order to determine the population estimate for the given area

Table 2 below lists the area correction factors and species' correction factors used for the game counted in June 2013. Note that the area correction factors are based on the precise odometer readings for the route length.

Table 2

Correction factors (June 2013)						
Route No.	Total count area per zone (ha)	Route distance (km)	Area Correction Factor (a.c.f)		Species	Species correction Factor (s.c.f)
1	16100	52.0	3.10		Oryx	1.4
2	16330	52.1	3.13		Springbok	1.6
3	24110	57.6	4.19		Kudu	2.6
4	18780	47.0	4.00		Steenbok	10.0
5	16120	71.0	2.27		Plains Zebra	1.2
6	17270	35.0	4.93		Ostrich	1.1
7	25380	56.0	4.53		Red Hartebeest	1.5
8	20190	51.2	3.94		Ludwig's Bustard	1.0
9	16450	51.0	3.23			
10	23502	60.0	4.09			
Total	194232	532.9				

## 4. Objectives

### 4.1 Population estimates (P) – how many animals:

Actual number of animals seen\* (S)

Area correction factor (A)

Species correction factor (B)

Formula for calculating population estimates\*

$$(S \times A) \times B = P$$

*\*Known numbers*

Note that where total numbers of species with small populations are known (e.g. for recently introduced species such as red hartebeest, plains zebra, giraffe and blesbok), these known totals are used for the final population estimates in preference to the above calculated estimates.

## 4.2 Biomass estimates and change

Population estimates are multiplied by the mean weight of the species and divided by the total count area (ha) to get the estimated biomass per species.

Estimated wildlife numbers (E)  
Mean mass per species (M)  
Total no. of hectares (H)

**Formula for calculating biomass estimates**

$$(E \times M) \div H = B$$

## 4.3 Wildlife distribution/density (K) – where are they?

Data from actual sightings (i.e. not estimates) for all count routes are “normalised” to animals counted per 100km. This is done in order to standardize the results to a value that is uniform for all count routes, thus enabling us to obtain accurate density and distribution figures for count zones.

Actual number of animals seen (S)  
Length of route (R)  
Animals seen per 100km driven (K)

**Formula for calculating animals seen per 100km driven**

$$(S \div R) \times 100 = K$$

## 4.4 Population change (R) – are numbers increasing or decreasing?

Data from actual sightings (i.e. not estimates) are also used to calculate the change in population over the previous year. As with distribution above, normalised or standardised data need to be used so that meaningful comparisons can be made. The data from each route are then compared to previous count data and the percentage change for each route and for the reserve as a whole can be calculated. The percentage change for the total of each species can be calculated in the same way.

Previous value (P)  
Current value (C)  
Percentage change (R)

**Formula for calculating percentage change**

$$[(C - P) \div P] \times 100 = R$$

Population changes over the longer term are also investigated by means of a comparative data analysis, covering the full period since the inception of the game counts (June 2005).



## 5. Findings for the June 2013 count:

### 5.1 Population estimates:

For each route, the number of each species counted within the strip width (< 500m) was recorded. The total number counted per species per route was then multiplied first by the relevant area correction factor (a.c.f.; see Table 1) for each route, and then by the relevant species correction factor (s.c.f.) in order to produce a total estimate per species per zone. These data are shown in Tables 3.1 – 3.10 (see Appendix 1).

The total estimates per species per zone were then combined for all zones in order to determine the total population estimate for each plains game species in the count area (see table 4.1 below). Total estimated numbers of game for the June 2013 count compared to those from the June 2012 count are shown in Table 4.2

*Table 4.1*

Total estimated numbers of game (Zone 1-10; Jun 13)		
Species	No seen under 500m	Total no. corrected for area + species
Oryx	1943	10087
Springbok	997	5919
Kudu	1	11
Steenbok	0	0
P. zebra*	352*	352*
Ostrich	81	285
Blesbok*	3*	3*
Hartebeest*	204*	204*
<b>Total</b>	<b>3581</b>	<b>16861</b>
Giraffe*	6*	
Ludwigs Bustard**	48**	

\* Numbers are known

\*\* Not included in count

Table 4.2

Total estimated numbers of game (Zone 1-10; Jun 12 - Jun 13)					
Species	Jun-12		Jun-13		Percentage change
	No. Counted under 500m	Total no. corrected for area + for species	No. Counted under 500m	Total no. corrected for area + for species	
Oryx	1380	7296	1943	10087	38
Springbok	1208	6069	997	5919	-2
Kudu	4	41	1	11	-74
Steenbok	0	0	0	0	0
P. zebra*	273	470*	174	352*	-25
Ostrich	160	765	81	285	-63
Blesbok*	0	7*	0	3*	-57
Hartebeest*	177	177*	159	204*	15
<b>Total</b>	<b>3202</b>	<b>14825</b>	<b>3355</b>	<b>16861</b>	<b>14</b>
Giraffe**		6*		6*	0
Ludwigs Bustard**	41	116**	48	177**	37

\* Numbers are known (adults)

\*\* Not included in count

## 5.2 Biomass estimates

Biomass estimates are important in terms of managing habitat conditions and inter-specific competition. Note that agricultural Livestock Units (LSU) are not used for determining the biomass of wildlife species, due to differences between domestic and wild animals in aspects such as grazing/browsing patterns, and agricultural stocking according to a camps system as opposed to the open, unfenced system within the Reserve.

The tables below show the biomass estimates for the June 2013 and the percentage change compared to the count of June 2012.

*Table 5.1*

Total wildlife numbers and wildlife biomass on NamibRand for June 2013 (Zone 1-10) ; 194232 ha)				
Wildlife Species	Mean mass (kg)	Estimated wildlife numbers from June 13 game count	Species biomass (kg)	Biomass per ha (kg)
				<b>TOTAL</b>
Oryx	220	10087	2219140	11.43
Springbok	38	5919	224922	1.16
Kudu	180	11	1980	0.01
P. zebra*	280	352	98560	0.51
Ostrich	68	285	19380	0.10
Hartebeest*	130	204	26520	0.14
Steenbok	11	0	0	0.00
Blesbok*	100	3	300	0.00
<b>Total</b>	<b>1027</b>	<b>16861</b>	<b>17316247</b>	<b>13.34</b>

\* Numbers are known

Table 5.2

Total wildlife numbers and wildlife biomass on NamibRand for June 2012 and June 2013 (Zone 1-10) ; 194232 ha)

Wildlife species	Mean mass (kg)	Jun-12			Jun-13			
		Estimated wildlife numbers from June 2012 game count	Species Biomass (kg)	Biomass per ha (kg)	Estimated wildlife numbers from June 2013 game count	Species Biomass (kg)	Biomass per ha (kg)	Biomass percentage change
				TOTAL			TOTAL	
Oryx	220	7296	1605120	8.26	10087	2219140	11.43	38.32
Springbok	38	6069	230622	1.19	5919	224922	1.16	-2.43
Kudu	180	41	7380	0.04	11	1980	0.01	-73.16
P. zebra *	280	470	131600	0.68	352	98560	0.51	-25.07
Ostrich	68	765	52020	0.27	285	19380	0.10	-62.73
Red Hartebeest*	130	177	23010	0.12	204	26520	0.14	15.31
Steenbok	11	0	0	0.00	0	0	0.00	0.00
Blesbok*	100	7	700	0.00	3	300	0.00	-57.12
<b>Total</b>		<b>14825</b>	<b>2050452</b>	<b>10.55</b>	<b>16861</b>	<b>2590802</b>	<b>13.34</b>	<b>26.41</b>

\* Numbers are known

### 5.3 Wildlife distribution/density

Wildlife distribution is based on density: the actual number of animals per species counted (at a distance of <500m) per 100 km per route. The distribution and density of the major individual species (oryx, springbok, kudu, ostrich) per count zone in June 2013 are presented below (Figure 2.1 – 2.6). The total distribution and density for the count area is shown in Figure 2.7. Note that the data are indicated on a gradient from dark (high values) to light (low values).

Figure 2.1 Distribution/density of oryx

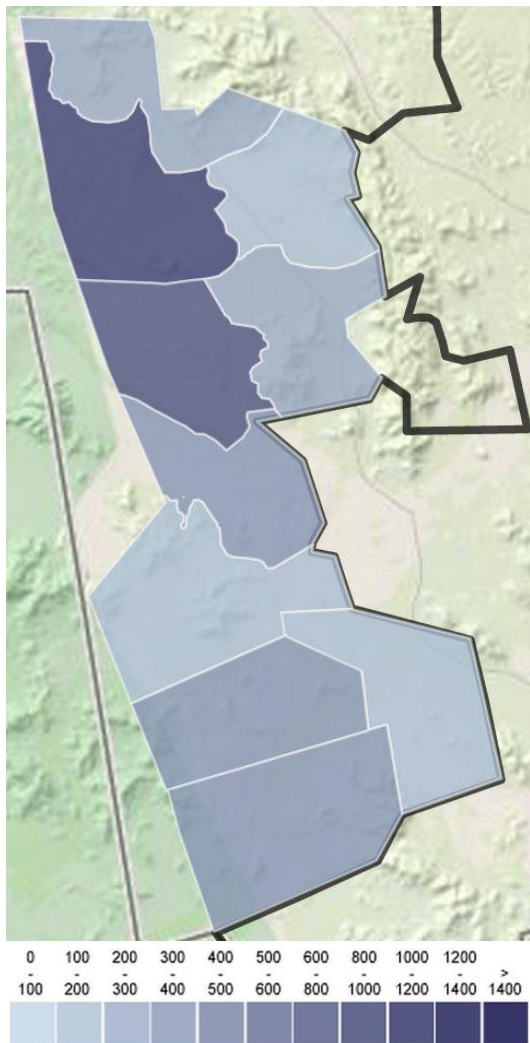


Figure 2.2 Distribution/density of springbok

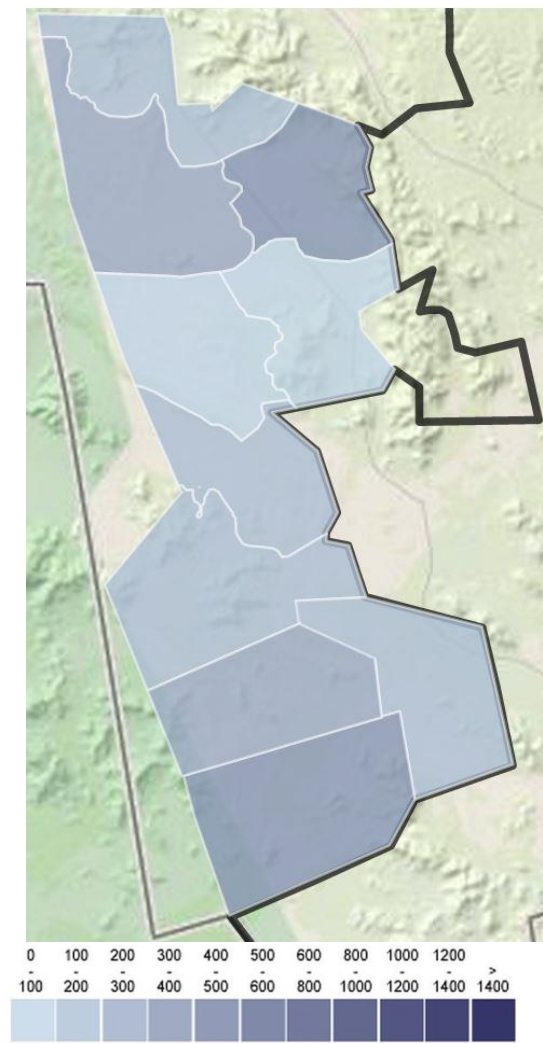


Figure 2.3 Distribution/density of kudu

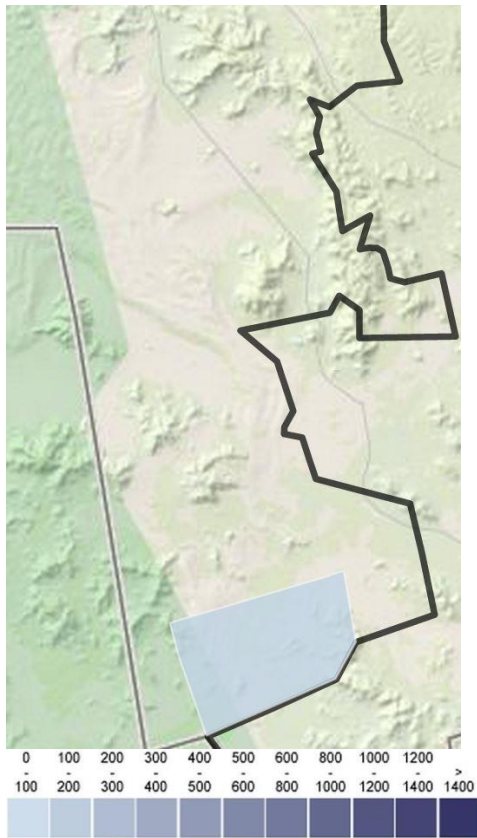


Figure 2.4 Distribution/density of Ostrich

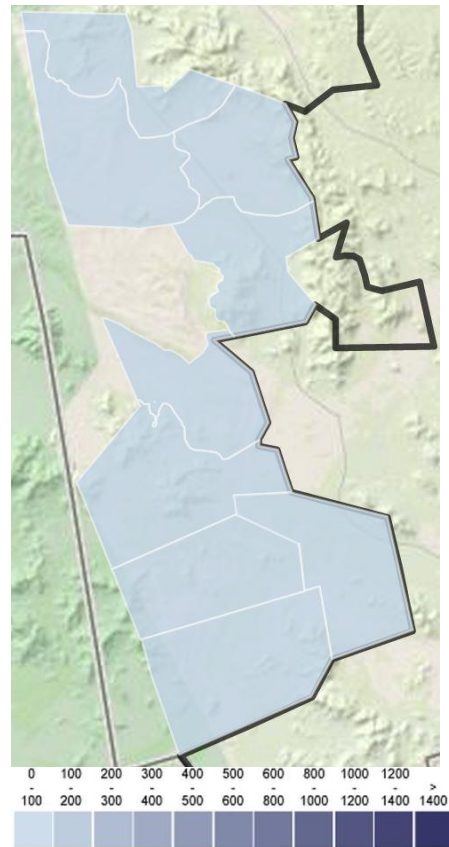
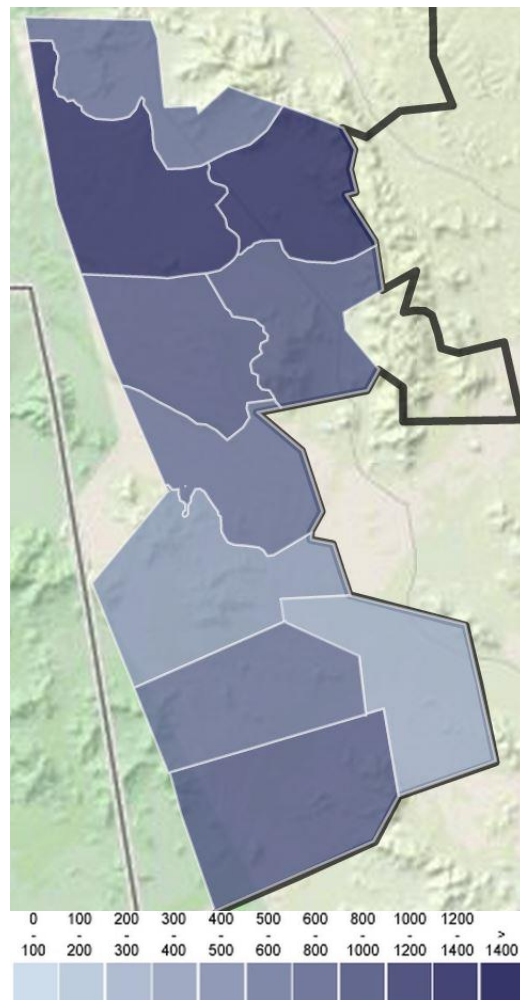


Figure 2.5 Total wildlife distribution/density



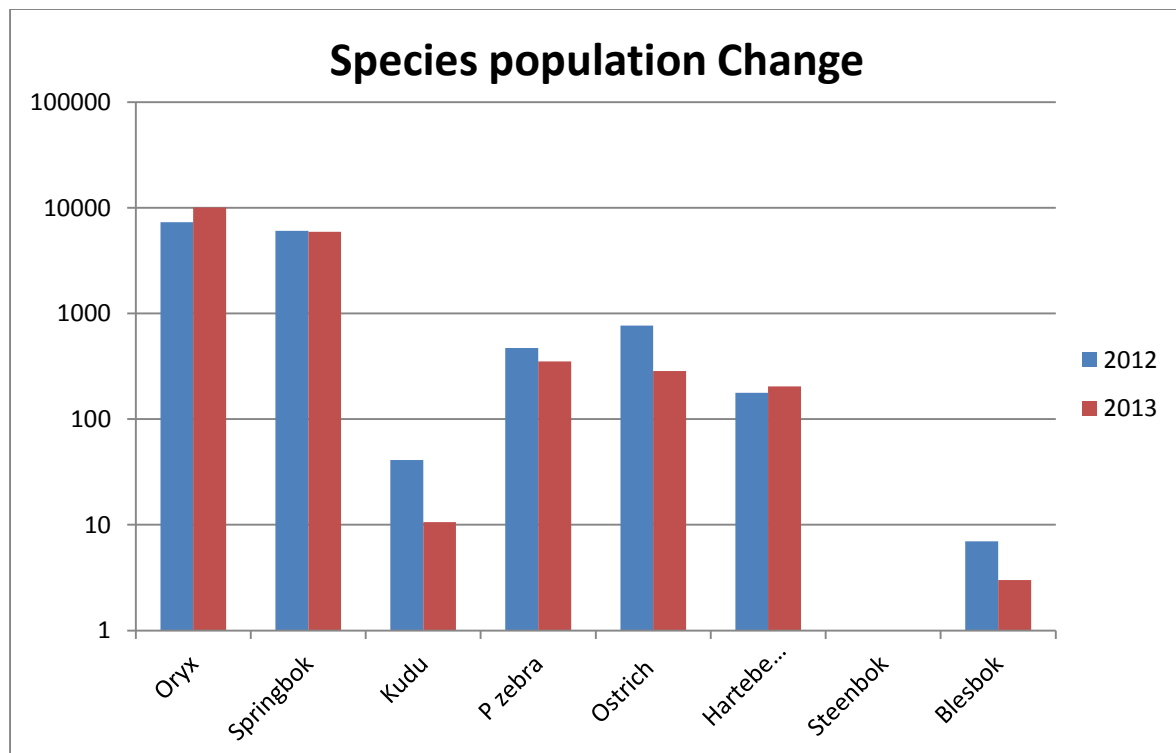
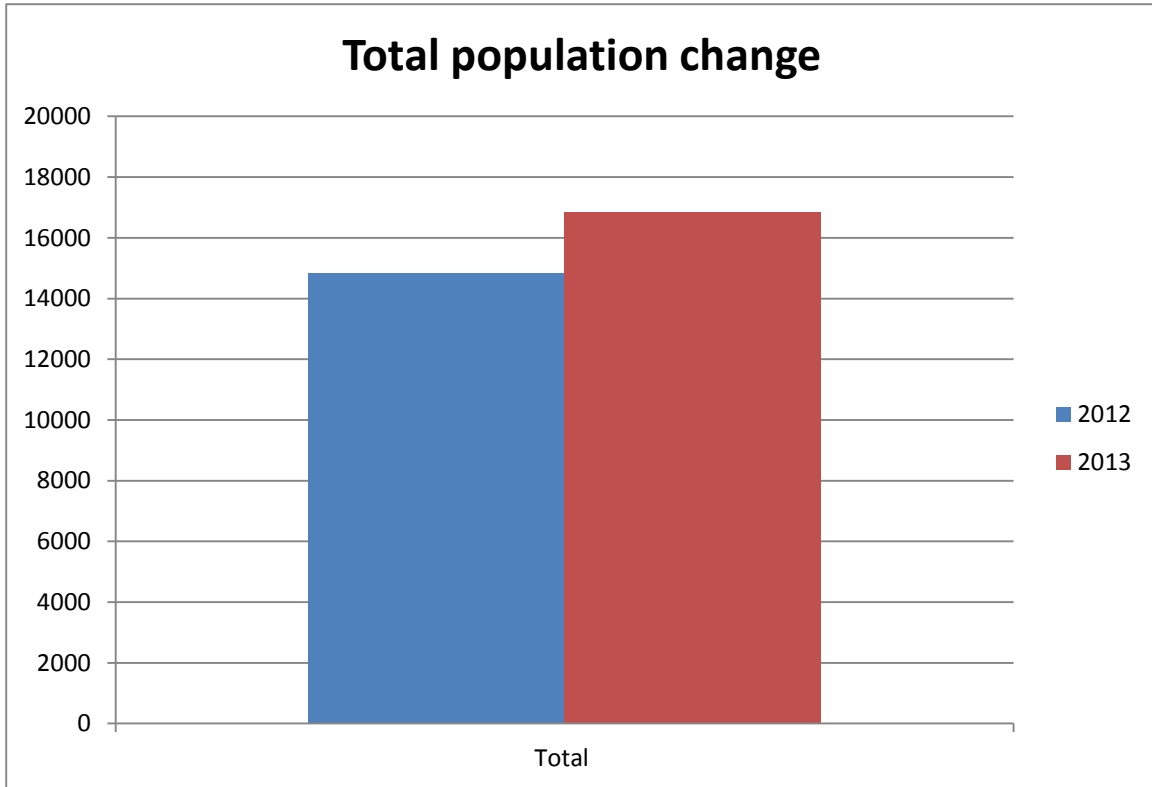
The total wildlife distribution/density for all species combined in the count area in June 2013, compared to June 2012, is shown in Table 6 below.

*Table 6*

Total no. of animals counted per 100km per route (June 2012 - June 2013)			
Route	Jun-12 Route 1-10	Jun-13 Route 1-10	%change (Jun-12 to Jun-13)
1	767	515	-32.9
2	873	1052	20.5
3	483	1104	128.6
4	406	717	76.6
5	745	570	-23.5
6	1611	429	-73.4
7	259	350	35.1
8	408	578	41.7
9	369	280	-24.1
10	405	705	74.1
<b>Average per route: 1-10</b>	<b>632.6</b>	<b>630</b>	<b>-0.4</b>

## 5.4 Population change

The graphs below show a comparison of data from 2012 and 2013. All graphed data are retained from route 1 to 10 in the respective years.





## **6. Discussion and conclusions**

### **Oryx**

In the results of the pollution estimates for oryx, showed a record number of oryx estimated (10078) since the game count was initiated in 2005, and that even with the lower rainfall this year and last year, the oryx numbers are still increasing. This could still be the effect of the very good rainfall in 2011 and that the grazing available only started to deteriorate mid-2013.

As a result of higher population estimates, the oryx biomass per hectare has also gone up to 11.43kg/ha compared to 8.26kg/ha in the previous year. This is due to effect of the grazing availability if good rains do not intervene soon.

### **Springbok**

The estimated number of springbok has gone down by 2% in comparison with last year. This could a result of the fact that some of the springbok have moved east onto neighbouring following the better rains to the east. The decrease is also owing to the fact that quite a number springbok have dead, either through natural causes and/or been caught in fences in the attempt to move east.

As a result of lower population estimates, the springbok biomass per hectare has also gone down to 1.16kg/ha compared to 1.19kg/ha in the previous year.

### **Kudu**

Only 1 kudu, counted in route 10, was recorded in the count data. Taking into account the species and area correction factor, this gives us an estimate of 11 kudu on the Reserve compared to the estimate of 41 in last year's count. As kudu's are very water dependent, the lower rainfall last year and this year have caused more natural mortifies in the species and forced them to move out of the mountainous fence-free area, which resulted in a lot of kudu getting stuck in fences.

As a result of lower population estimates, the kudu biomass per hectare has also gone down by 73% compared to the previous year.

## **P. Zebra**

The numbers given for plains zebra in the population estimates are taken from an independent total count done by the reserve staff in the north of the reserve, and from actual sightings in the south of the reserve as some of the plains zebra were relocated to the south and others have voluntarily moved down to the south.

The decrease in plains zebra numbers is directly a result of the game capture that took place in October 2013. 88 zebra were sold and 14 were relocated to the south (Springbokvlakte).

Because of the decrease in population size, the species biomass has also decreased. The species biomass per hectare has gone down from 0.68kg/ha to 0.51 in the last year.

## **Ostrich**

Ostrich population estimates continue to fluctuate as seen in past years. After the increase in species estimates in 2012, the number has gone down again in 2013 to 285, decreasing a staggering 63%.

## **Blesbok**

Only three blesbok remain in the south of the Reserve (route 9). Efforts will continue to eradicate these 3 in order to get rid of the alien species.

## **Red Hartebeest**

The numbers given for red hartebeest in the population estimates are taken from an independent total count done by the reserve staff in the north of the reserve.

A steady increase in hartebeest number has been seen over the years, and the trend continues this year with the total number surpassing the 200 mark to total 204 counted, which is an 15% increase from last year's total of 177.

## **Giraffe**

The giraffe number is at six again, after the two calves from 2011 were removed in October 2012, and another two calves were born in 2012.

## 7. Acknowledgments

NamibRand would like to thank all its concessionaires, stakeholders, neighbours and all the participants for their enthusiastic involvement to make this year's game count another success. Participants were: John Bernstein, Quinton Beukes, Ruben Bonifatius, Maria Couto, John D' Almeida, Viktoria Endjala, Frans Haupindi, Pat Haurahan , Josia Hangula, Quintin Hartung, Vanessa Hartung, Petrus Ilonga, George Kaura , Sebastiaan Kazimbu, Jurgen Klein, Jakobus Kooper , Elizabeth Lammert , Willie Lammert, Lucas Mbangu, Lesley Moosteng, Kefas Muzorongondo, Titus Nangolo, Jonathan Nangombe , Addhard Odendaal, Nils Odendaal, Peter Odendaal, Jule Piloth, Larkin Powell, Elsawie Rooi, Steny Schoeman, Ann Scott, Mike Scott, Sam Shilongo , Lee Tindall, Murray Tindall , Retatuhe Tjikotoke , Abraham Tsoabeb , Absalom Vilho, Elton Vries, Elias Viyani, Richard Wafer Mauer, Barbara Wayrauch, Franziska Woolfe and Peter Woolfe.

All your help is immensely appreciated.

## 8. Appendix

### Results per count route/zone

Tables 3.1 to 3.10 list the data collected on each route in June 2013, which were used as a basis for analysis. Numbers seen within the strip width (under 500m) have been multiplied first by the relevant area correction factor (a.c.f) for each route, and then by the relevant species correction factor (s.c.f); see Table 2.

Table 3.1

<b>Route 1</b>				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 3.10)	No. corrected for area + species
Oryx	133	133	412.3	577.22
Springbok	80	80	248	396.8
Kudu	0	0	0	0
Steenbok	0	0	0	0
Plains Zebra**	30	30	93	111.6
Ostrich	23	23	71.3	78.43
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>266</b>	<b>266</b>	<b>824.6</b>	<b>1164.05</b>
Ludwig's Bustard*	2	2	6.2	6.2

\* Not included in count

\*\* Numbers known

Table 3.2

<b>Route 2</b>				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 3.13)	No. corrected for area + species
Oryx	85	85	266.05	372.47
Springbok	182	182	569.66	911.456
Kudu	0	0	0	
Steenbok	0	0	0	
Plains Zebra**	72	72	225.36	270.432
Ostrich	32	32	100.16	110.176
Red Hartebeest**	157	157	491.41	737.115
Giraffe	0	0	0	0
<b>Total</b>	<b>528</b>	<b>528</b>	<b>1652.64</b>	<b>2401.649</b>
Ludwig's Bustard*	20	20	62.6	62.6

\* Not included in count

\*\* Numbers known

Table 3.3

<b>Route 3</b>				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 4.19)	No. corrected for area + species
Oryx	524	461	1931.59	2704.226
Springbok	148	148	620.12	992.192
Kudu	0	0	0	
Steenbok	0	0	0	
Plains Zebra**	15	15	62.85	75.42
Ostrich	9	6	25.14	27.654
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>696</b>	<b>630</b>	<b>2639.7</b>	<b>3799.492</b>
Ludwig's Bustard*	6	6	25.14	25.14

\* Not included in count

\*\* Numbers known

Table 3.4

Route 4				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 4.00)	No. corrected for area + species
Oryx	321	321	1284	1797.6
Springbok	11	11	44	70.4
Kudu	0	0	0	0
Steenbok	0	0	0	0
Plains Zebra**	0	0	0	0
Ostrich	0	0	0	0
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>332</b>	<b>332</b>	<b>1328</b>	<b>1868</b>
Ludwig's Bustard*	5	5	20	20

\* Not included in count

\*\* Numbers known

Table 3.5

Route 5				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 2.27)	No. corrected for area + species
Oryx	306	306	694.62	972.468
Springbok	76	76	172.52	276.032
Kudu	0	0	0	
Steenbok	0	0	0	
Plains Zebra**	15	14	31.78	38.136
Ostrich	1	7	15.89	17.479
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>398</b>	<b>403</b>	<b>914.81</b>	<b>1304.115</b>
Ludwig's Bustard*	2	2	4.54	4.54

\* Not included in count

\*\* Numbers known

Table 3.6

Route 6				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 4.93)	No. corrected for area + species
Oryx	100	77	379.61	531.454
Springbok	22	22	108.46	173.536
Kudu	0	0	0	0
Steenbok	0	0	0	0
Plains Zebra	40	40	197.2	236.64
Ostrich	1	1	4.93	5.423
Red Hartebeest	2	2	9.86	14.79
<b>Total</b>	<b>165</b>	<b>142</b>	<b>700.06</b>	<b>961.843</b>
Ludwig's Bustard*	8	8	39.44	39.44

\* Not included in count

\*\* Numbers known

Table 3.7

Route 7				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 4.53)	No. corrected for area + species
Oryx	91	91	412.23	577.122
Springbok	104	104	471.12	753.792
Kudu	0	0	0	0
Steenbok	0	0	0	0
Plains Zebra**	0	0	0	0
Ostrich	1	1	4.53	4.983
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>196</b>	<b>196</b>	<b>887.88</b>	<b>1335.897</b>
Ludwig's Bustard*				

\* Not included in count

\*\* Numbers known

Table 3.8

<b>Route 8</b>				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 3.94)	No. corrected for area + species
Oryx	183	183	721.02	1009.428
Springbok	112	112	441.28	706.048
Kudu	0	0	0	0
Steenbok	0	0	0	0
Plains Zebra**	0	0	0	0
Ostrich	1	1	3.94	4.334
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>296</b>	<b>296</b>	<b>1166.24</b>	<b>1719.81</b>
Ludwig's Bustard*				

\* Not included in count

\*\* Numbers known

Table 3.9

<b>Route 9</b>				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 3.23)	No. corrected for area + species
Oryx	77	77	248.71	348.194
Springbok	55	55	177.65	284.24
Kudu	0	0	0	0
Steenbok	0	0	0	0
Plains Zebra**	0	0	0	0
Ostrich	9	9	29.07	31.977
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>141</b>	<b>141</b>	<b>455.43</b>	<b>664.411</b>
Ludwig's Bustard*	2	2	6.46	6.46

\* Not included in count

\*\* Numbers known



Table 3.10

<b>Route 10</b>				
Species	Number seen total	Number seen under 500m	No. corrected for area (a.f.c. = 4.09)	No. corrected for area + species
Oryx	209	209	854.81	1196.734
Springbok	207	207	846.63	1354.608
Kudu	1	1	4.09	10.634
Steenbok	0	0	0	0
Plains Zebra**	2	2	8.18	9.816
Ostrich	1	1	4.09	4.499
Red Hartebeest**	0	0	0	0
<b>Total</b>	<b>420</b>	<b>420</b>	<b>1717.8</b>	<b>2576.291</b>
Ludwig's Bustard*	3	3	12.27	12.27

\* Not included in count

\*\* Numbers known

NB - The No. Corrected for area and species does not apply to the Plains Zebra and Red Hartebeest as the total number for these species are known.