

Results of the  
NamibRand Nature Reserve  
and Pro-Namib Conservancy  
Annual Game Count  
23 May 2020

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## 1. Introduction

This report provides summarized results and analysis of the annual game count held on the NamibRand Nature Reserve and the Pro-Namib Conservancy on the 23<sup>th</sup> of May 2020.

A game count briefing was held at the NamibRand Nature Reserve AGM on the day preceding the count where Control Warden Murray Tindall highlighted the objectives of the count and outlined the methodology and rules for the teams who would conduct the count. This helps to ensure consistency over consecutive years and allows a more accurate comparison from year to year.

Previous years data has been entered into a purpose designed database which generates the estimates used in this report in terms of total population, density and biomass. A few minor adjustments have been made to the database in order to improve its accuracy and this has slightly altered the figures for previous years as well as this years' count.

Surprisingly, even though this is the fifth year of drought the population estimates, as well as the overall density, showed marked increases this year. Individual populations of the two major grazers in this ecosystem, oryx and springbok, showed increases of 60% and 10% respectively. Overall, there was a significant increase in the majority of the different species populations this year (43% increase). However, the population of Ruppel's Korhaan was the only population that showed a decrease (36%).

The distribution of animals across the reserve showed a slight trend of migration towards the northern parts of the NamibRand Nature Reserve. The majority of animals were concentrated near the north of the reserve, in plains/grassland areas (Zones 2, 3 and 4). The highest estimated populations of animals were seen in Zones 2 and 3.

It is worth reiterating that this census method is best suited to large plains game such as oryx, springbok and Burchell's zebra and is less suited to smaller species such as steenbok, or species with different habitat requirements such as kudu or mountain zebra. In addition, the estimates provided are intended to give an indication of population numbers and enable a comparison from year to year and may not be an entirely accurate reflection of the actual number of animals on the Reserve.

Please note that while the game count method employed is good for estimating larger numbers of common plains game, it is less suited for 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. Summary

Data collected in the May 2020 game count was entered into our database and analyzed. The below results give a summary of all animals counted, this includes animals seen further than 500m.

*Table 1. Total number of game seen on the count for May 2020.*

<b><u>Total of Species</u></b>					
<b><u>Mammals</u></b>		<b><u>Carnivores</u></b>		<b><u>Birds</u></b>	
<b>Giraffe</b>	<b>3</b>	Bat-eared Fox	<b>23</b>	Greater Kestrel	<b>2</b>
<b>Hartebeest</b>	<b>1</b>	Black-backed Jackel	<b>5</b>	Lappet-faced Vulture	<b>11</b>
<b>Gemsbok</b>	<b>561</b>			Ludwig Bustard	<b>10</b>
<b>Burchell Zebra</b>	<b>152</b>			Ostrich	<b>83</b>
<b>Springbok</b>	<b>585</b>			Rüppel Korhaan	<b>15</b>

The results below give you the total of species counted per route, this includes animals seen above 500m.

*Table 2. Total number of game seen on each route for May 2020.*

<b><u>Total species counted per route</u></b>	
<b>1</b>	<b>16</b>
<b>2</b>	<b>155</b>
<b>3</b>	<b>354</b>
<b>4</b>	<b>8</b>
<b>5</b>	<b>34</b>
<b>6</b>	<b>198</b>
<b>7</b>	<b>320</b>
<b>8</b>	<b>72</b>
<b>9</b>	<b>269</b>
<b>10</b>	<b>25</b>

The below table give you the total species per route seen under or by 500m. This is the amount we use to do the calculation for the rest of the document.

*Table 3. Total number of game seen on each route less than 500m for May 2020.*

<b><u>Total species counted per route less than 500</u></b>	
<b>1</b>	<b>15</b>
<b>2</b>	<b>142</b>
<b>3</b>	<b>354</b>
<b>4</b>	<b>8</b>
<b>5</b>	<b>35</b>
<b>6</b>	<b>182</b>
<b>7</b>	<b>320</b>
<b>8</b>	<b>75</b>
<b>9</b>	<b>269</b>
<b>10</b>	<b>25</b>

The results shown below are bearing our three core objectives in mind:

Objective 1: Population and biomass estimates:

Population estimates:

Table 4. Total number of game seen and the estimated numbers for May 2020.

<b>Total estimated numbers of game (Zone 1-10; May 2020)</b>		
<b>Species</b>	<b>No. Counted</b>	<b>Estimate 2020</b>
Gemsbok	552	6758
Springbok	571	8981
Kudu	0	0
Steenbok	0	0
Ostrich	76	1293
Ludwigs Bustard	10	168
Ruppel's Korhaan	15	984
B. zebra	152	2058
Hartebeest	1	4
<b>Total</b>	<b>1376</b>	<b>20242</b>
Giraffe*	10	10

\* Total numbers known

Biomass estimates

Table 5. Wildlife biomass estimates for May 2020.

<b>Total wildlife numbers and wildlife biomass on NamibRand for May 2020 (Zone 1-10) ; 224 209 ha)</b>				
<b>Species</b>	<b>Mean mass (kg)</b>	<b>Estimated wildlife numbers from May 2020 game count</b>	<b>Species biomass (kg)</b>	<b>Biomass per ha (kg)</b>
Gemsbok	220	6758	1486685	7.96
Springbok	38	8981	341267	1.83
Kudu	180	0	0	0.00
Steenbok	11	0	0	0.00
Ostrich	68	1293	87893	0.47
B. Zebra	300	2058	617334	3.31
Hartebeest	130	4	574	0.00
<b>Total</b>	<b>947</b>	<b>19093</b>	<b>18081183</b>	<b>13.57</b>

## Objective 2: Wildlife distribution and density

Table 6. Total number of animals counted per 100km in each route and the respective density percentage per zone.

<b>Total no of animals counted per 100 km per route</b>			
<b>Route</b>	<b>Route length (km)</b>	<b>No of animals counted/100km</b>	<b>% of total animals counted per 100km</b>
1	47	15	1%
2	52	142	10%
3	60.7	354	25%
4	43	8	1%
5	70	35	2%
6	35	182	13%
7	55	320	22%
8	50	75	5%
9	52	269	19%
10	59	25	2%
<b>Total</b>	<b>523.7</b>	<b>1425</b>	

## Objective 3: Population change

Table 7. The overall population estimate has increased by 244.17%.

<b>Total estimated numbers of game (Zone 1-10; May 2019 - May 2020)</b>					
Species	May-19		May-20		Percentage change
	No. Counted	Total estimated number	No. Counted	Total estimated number	
Gemsbok	1026	3480	552	6758	94.19%
Springbok	267	1351	571	8981	564.75%
Kudu	0	0	0	0	0
Steenbok	0	0	0	0	0
Ostrich	65	175	76	1293	638.60%
Ludwig's Bustard	21	0	10	168	0
Ruppel's Korhaan	24	293	15	984	235.97%
B. zebra	307	485	152	1943	300.53%
Hartebeest	16	66	1	4	-93.31%
Total	<b>1726</b>	<b>5850</b>	<b>1379</b>	<b>20134</b>	<b>244.17%</b>
Giraffe*	10	10	10	10	0.00%

\* Total (estimate) numbers known

### 3. Count Methodology

The primary objectives of the game count are to determine the density and distribution of game and to estimate the total number of game in a given, or total, area. For this reason, the survey methodology used is a combination of the road strip census and game distribution map techniques. In layman's terms, these can be explained as follows:

#### Road strip count

This is one of the most effective methods to use when counting in a relatively open and homogenous landscape. For the purposes of the count, the total area is divided into game count zones, each with its own standardized route, as shown in Figure 1 on the next page. The game count zones were, as far as possible, deliberately predetermined into homogenous habitats because the visibility of animals differs in each habitat. Each route forms a strip transect through its zone within which the animals are counted. A transect width of 1km is used (500m on either side of the road). During the count, all animals on either side of the road are recorded, and the distances (at right angles to the vehicle and road) from the road to the animal or group of animals is recorded. These distance records are important, as they shape the effective strip width (ESW) values, which are automatically adjusted each year when data is entered into the database.

The length of the transect (distance traveled) and its relation to the area represented in the zone is used to calculate the area correction factors for each zone, i.e.  $\text{area represented}/\text{route length} = \text{area correction factor}$ . The respective effective strip width (ESW) values and transect width then determines the relevant species correction factors, i.e.  $\text{transect width} (1000\text{m}) / (\text{ESW} \times 2) = \text{species correction factor}$ . The area correction factors and species correction factors, adjusted by the relevant effective strip widths, i.e. how far each species is readily seen, is then used to calculate the population estimates. So basically, the area correction factor multiplies the number seen up based on the percentage of the area sampled and assumes all animals within 500m of the transect line are detected. The species correction factor then adjusts this estimate based on the detection curve (ESW) for the species. The correction factors and route distances as used in the 2015 game count methodology, along with the area represented per zone can be seen in table 5 below.

*Table 5. Total count areas per zone (ha), route distances, area correction factors, effective strip widths and species correction factors for each species within each zone for 2020.*

<b>Count areas, area correction factors, effective strip widths and species correction factor for 2020</b>										
Route no.	Total area per zone (ha)	Area per route	Route distance (km)	Area correction factor	Species	Effective strip width (m)	Species correction factor	Species	Effective strip width (m) routes 1-10	Species correction factor routes 1-10
1	18072	12513	47	2.66	Oryx	252	1.99	Ostrich	228	2.19
					Springbok	227	2.21	Kudu	0	0
2	18310	13779	52	2.65	Oryx	172	2.90	Steenbok	0	0
					Springbok	187	2.68	Rüppells Korhaan	51.08	9.79
					Burchell Zebra	236	2.12	Ludwigs bastard	115	4.37
3	27039	26424	60.7	4.35	Oryx	215	2.32			

					Springbok	180	2.78
4	21038	20996	43	4.88	Oryx	195	2.56
5	18038	17491	70	2.50	Oryx	296	1.69
6	19352	11589	35	3.31	Oryx	115	4.34
					Springbok	103	4.83
					Burchell Zebra	99	5.03
7	28343	18833	55	3.42	Oryx	175	2.86
					Springbok	177	2.81
					Burchell Zebra	400	1.25
8	22452	19291	50	3.86	Oryx	403	1.24
					Springbok	500	1.00
					Burchell Zebra	140	3.57
9	21710	21125	52	4.06	Oryx	72	6.96
					Springbok	63	7.95
					Burchell Zebra	55	9.09
10	29855	24721	59	4.19	Oryx	103	4.88
					Springbok	290	1.72

<b>Total</b>	<b>224209</b>	<b>186762</b>	<b>523.7</b>				
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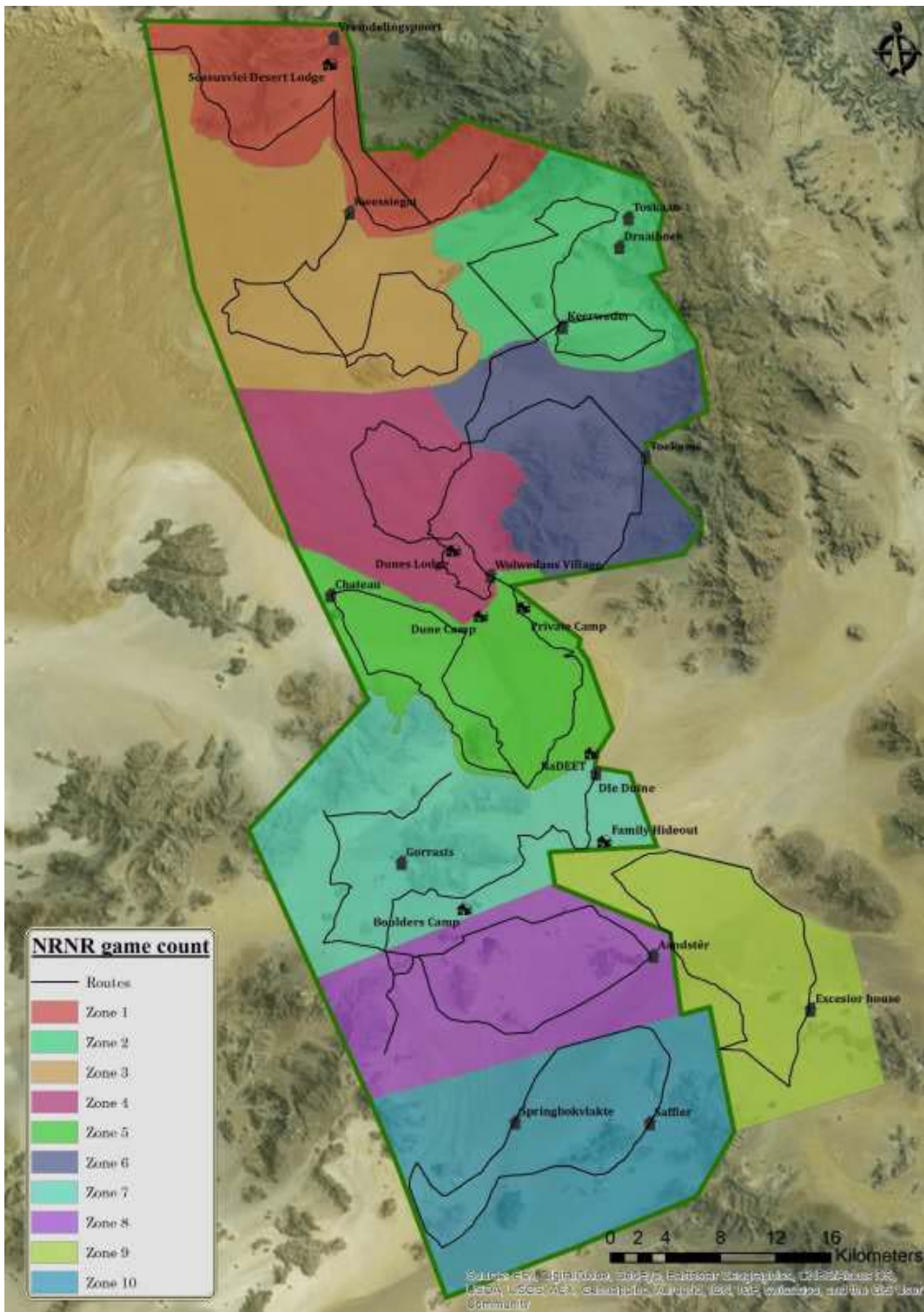


Figure 1. The game count area shows the ten zones used in May 2020 for the NamibRand Nature Reserve (1-8, 10) and the Pro-Namib Conservancy (9).

## Game distribution maps

In order to determine and show the distribution and density of game in the various zones of the count area, monad grids are used to map the locality of the animals counted. Each route is supplied with a map containing the monad, with reference numbers, of the zone in which that route is set as seen in the image below.

During the count the monad grid number in which animal counted is seen, is recorded. This grid number is then used to map the distribution of each recorded animal.

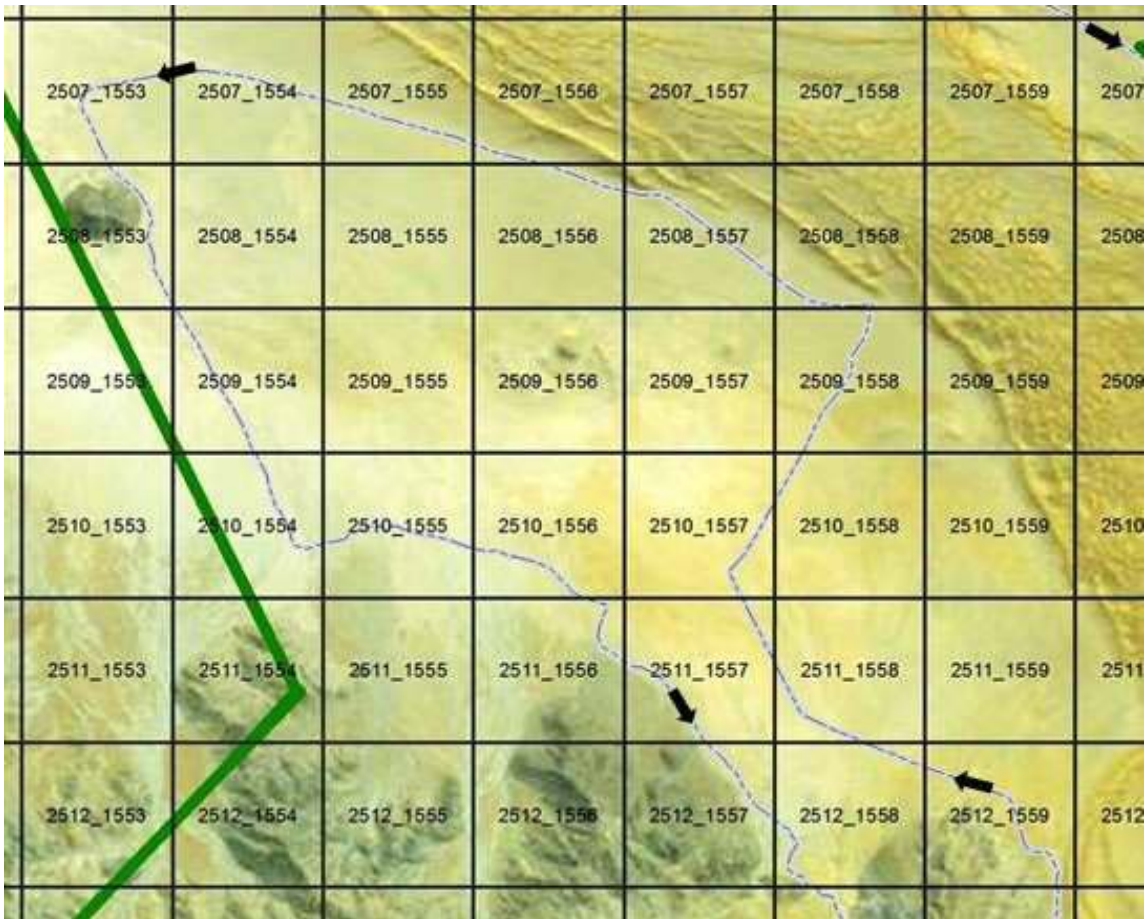


Figure 2. Monad maps.

## 4. Objectives and results of the May 2020 count:

### Objective 1: Population and biomass estimates

#### Population estimates:

The population estimates for individual species in the total count area are derived from the actual number of animals seen during the count and the relevant species and area correction factors that are applied to that number. The actual numbers seen is multiplied by the relevant area and species correction factors to get the population estimates.

S: Actual number of animals seen\*

A: Area correction factor

B: Species correction factor

\*Known numbers

Formula for calculating population estimates* $(S \times A) \times B = P$
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Note that where total numbers of species with small populations are known (e.g. for recently introduced species such as red hartebeest, Burchell's zebra and giraffe), these known totals are used for the final population estimates in reference to the above calculated estimates.

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 1 below).

Table 1. Total number of game seen and the estimated numbers for May 2020.

Total estimated numbers of game (Zone 1-10; May 2020)		
Species	No. Counted	Estimate 2020
Gemsbok	552	6758
Springbok	571	8981
Kudu	0	0
Steenbok	0	0
Ostrich	76	1293
Ludwigs Bustard	10	168
Ruppel's Korhaan	15	984
B. zebra	152	2058
Hartebeest	1	4
<b>Total</b>	<b>1376</b>	<b>20242</b>
Giraffe*	10	10

\* Total numbers known

## Biomass estimates

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.

E: Estimated wildlife numbers  
M: Mean mass per species  
H: Total no. of hectares  
B: Biomass estimate

Formula for calculating biomass estimates  
 $(E \times M) \div H = B$

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. These two species are different in aspects such as grazing/browsing patterns and agricultural stocking. LSU are also in a fenced systems opposed to the open, unfenced system within the Reserve.

Tables 6.1, 6.2 and 6.3 below show the biomass estimates for this year, and the biomass estimates for previous years compared to this year.

*Table 6.1 Wildlife biomass estimates for May 2020.*

<b>Total wildlife numbers and wildlife biomass on NamibRand for May 2020 (Zone 1-10) ; 224 209 ha</b>				
<b>Species</b>	<b>Mean mass (kg)</b>	<b>Estimated wildlife numbers from May 19 game count</b>	<b>Species biomass (kg)</b>	<b>Biomass per ha (kg)</b>
Gemsbok	220	6758	1486685	7.96
Springbok	38	8981	341267	1.83
Kudu	180	0	0	0.00
Steenbok	11	0	0	0.00
Ostrich	68	1293	87893	0.47
B. Zebra	300	2058	617334	3.31
Hartebeest	130	4	574	0.00
<b>Total</b>	<b>947</b>	<b>19093</b>	<b>18081183</b>	<b>13.57</b>

\* Total (estimate) numbers known

The chart in figure 3 below shows the biomass composition of the different species across the total count area for the year 2020.

*Figure 3. Biomass composition 2020.*



Table 6.2 Wildlife biomass (2020) percentage change compared to the count of May 2019.

Wildlife biomass on NamibRand for May 2019 and May 2020 (Zone 1-10) ; 224 209 ha)								
Wildlife species	Mean mass (kg)	May-19			May-20			
		Estimated wildlife numbers from May 2017 game count	Species Biomass (kg)	Biomass per ha (kg)	Estimated wildlife numbers from May 2018 game count	Species Biomass (kg)	Biomass per ha (kg)	Biomass percentage change
				TOTAL			TOTAL	
Gemsbok	220	3480	765600	4,10	6758	1486685	7.96	<b>94.19%</b>
Springbok	38	1351	51338	0,27	8981	341267	1.83	564.75%
Kudu	180	0			0			
Steenbok	11	0			0			
Ostrich	68	175	11900	0,06	1293	87893	0.47	638.60%
B. zebra	300	485	145500	0,78	2058	617334	3.31	324.28%
Red Hartebeest	130	66	8580	0,05	4	574	0.00	-93.31%
<b>Total</b>		<b>5557</b>	<b>982918</b>	<b>5,26</b>	<b>19093.11863</b>	<b>2533753.7</b>	<b>13.57</b>	<b>157.78%</b>

Table 6.3 Wildlife biomass estimates from 2018-2020.

Total wildlife biomass estimates (kg/ha) on NamibRand May 2018 to May 2020					
Wildlife species	May-18	May-19	% change from May-17	May-20	% change from May 18
Gemsbok	4,36	4,10	-5.92%	7.96	94.19%
Springbok	0,35	0,27	-21.45%	1.83	564.75%
Kudu	0,00	0,00	#DIV/0!	0.00	#DIV/0!
Steenbok	0,00	0,00	0.00%	0.00	0.00%
Ostrich	0,05	0,06	34.62%	0.47	638.60%
B. Zebra	0,80	0,78	-2.41%	3.31	324.28%
Hartebeest	0,05	0,05	-1.49%	0.00	-93.31%
<b>Total</b>	<b>5,6</b>	<b>5,3</b>	<b>-6.01%</b>	<b>5.3</b>	<b>0.00%</b>

## Objective 2: Wildlife density and distribution

To calculate the population density, the actual number of animals per species counted in each zone is divided by the respective route length and then multiplied by 100 to get the total number of animals seen per 100km.

S: Actual number of animals seen

R: Length of route

K: Wildlife density - i.e. Animals seen per 100km driven

$$\text{Formula for calculating wildlife density} \\ (S \div R) \times 100 = K$$

For the purposes of this report, wildlife distribution is based on the amount of animals seen in each monad. During the game count, each sighting is marked to the corresponding monad the animal(s) was seen in. This data is then used to map the distribution of the animals (i.e. where animals were seen).

Please note that for the total wildlife distribution, all game species counted were used in the (mapping) calculation. The total wildlife (species) distribution and density are shown in the maps below. These densities were calculated using the formula prescribed above.

Note that the data is indicated on a gradient from light (low values) to dark (high values).

Figure 4.1 Total wildlife distribution

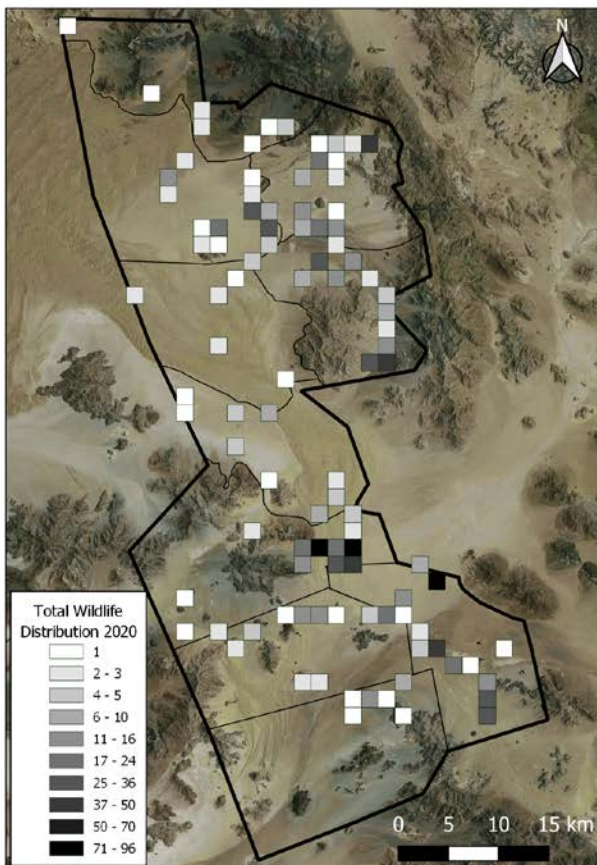


Figure 4.2 Total wildlife density

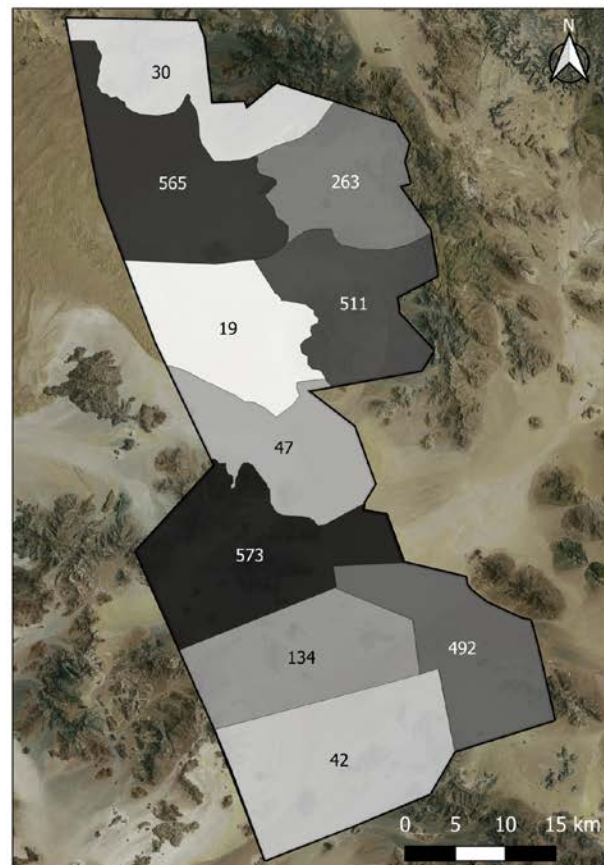




Figure 4.3 Distribution of Gemsbok

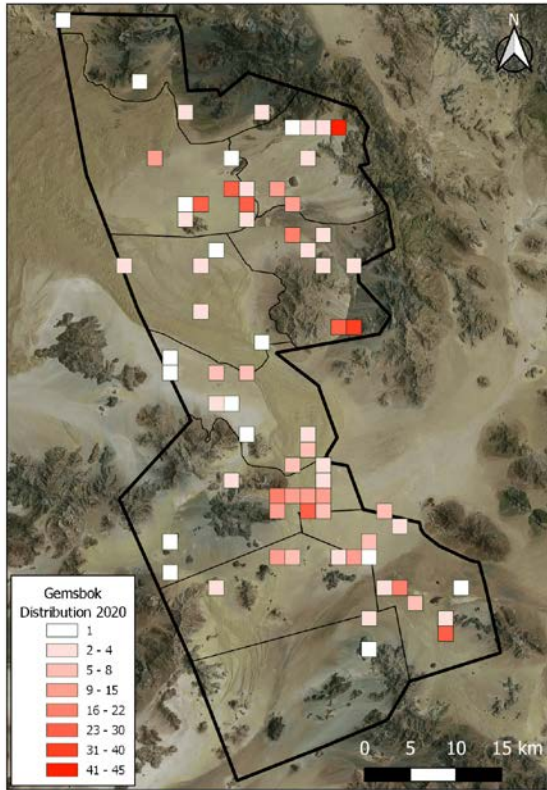


Figure 4.4 Density of Gemsbok

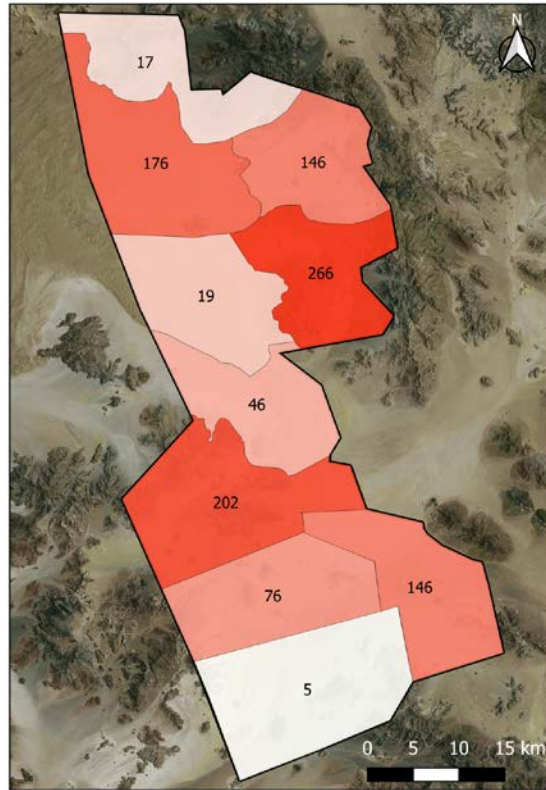


Figure 4.5 Distribution of Springbok

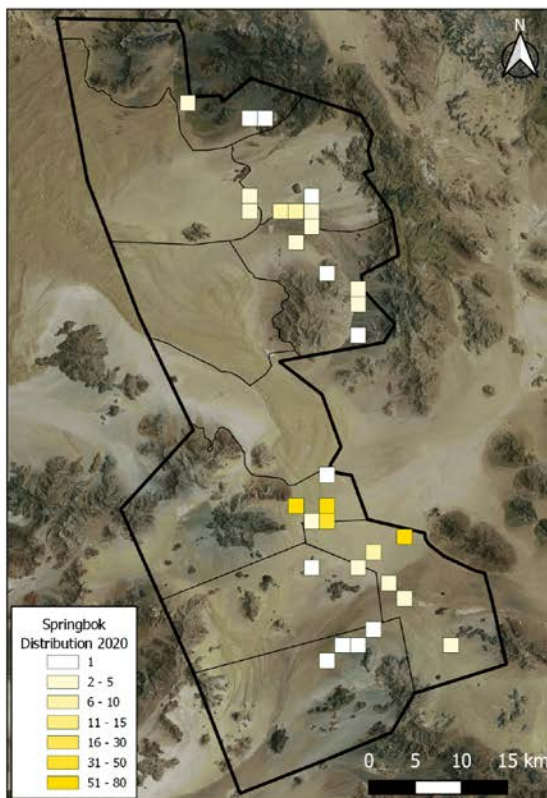


Figure 4.6 Density of Springbok

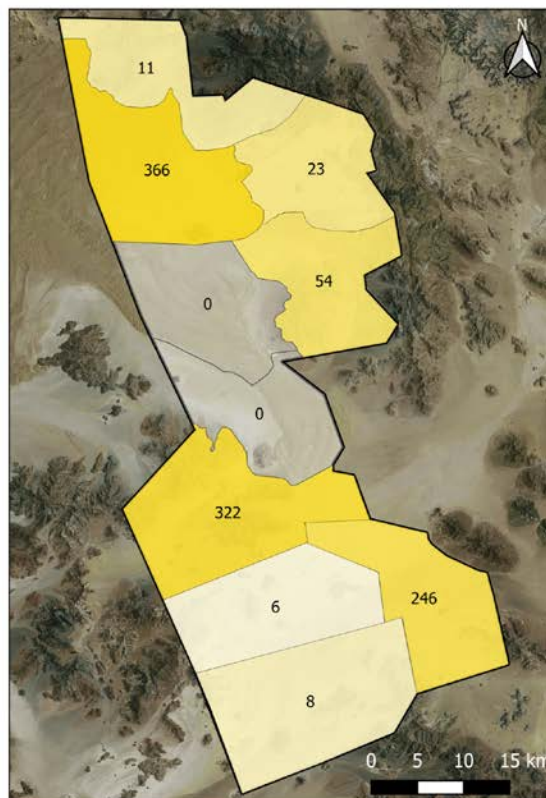




Figure 4.7 Distribution of *B. zebra*

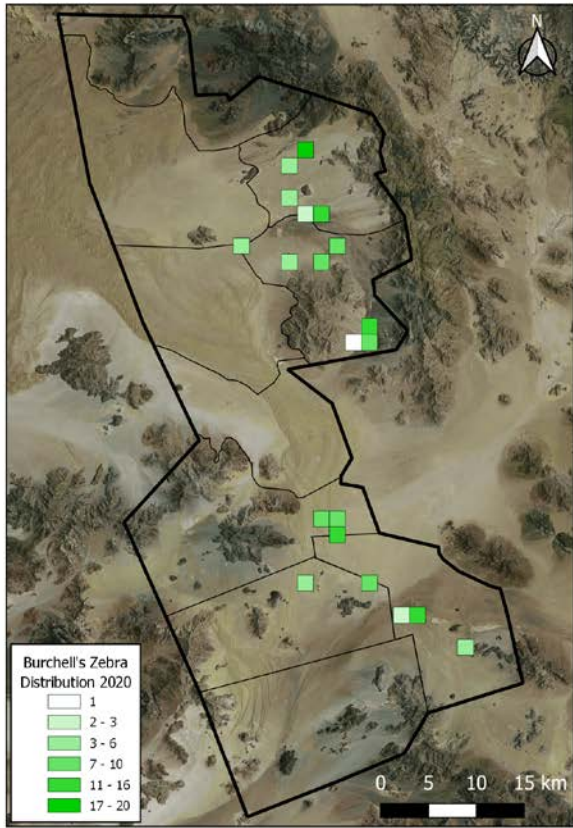


Figure 4.8 Density of *B. Zebra*

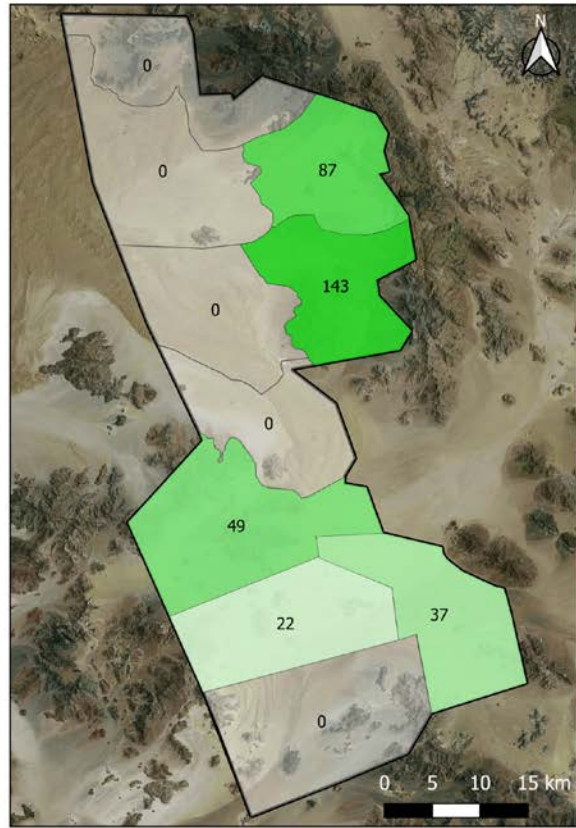


Figure 4.9 Distribution of Ostrich      Figure 4.10 Density of Ostrich

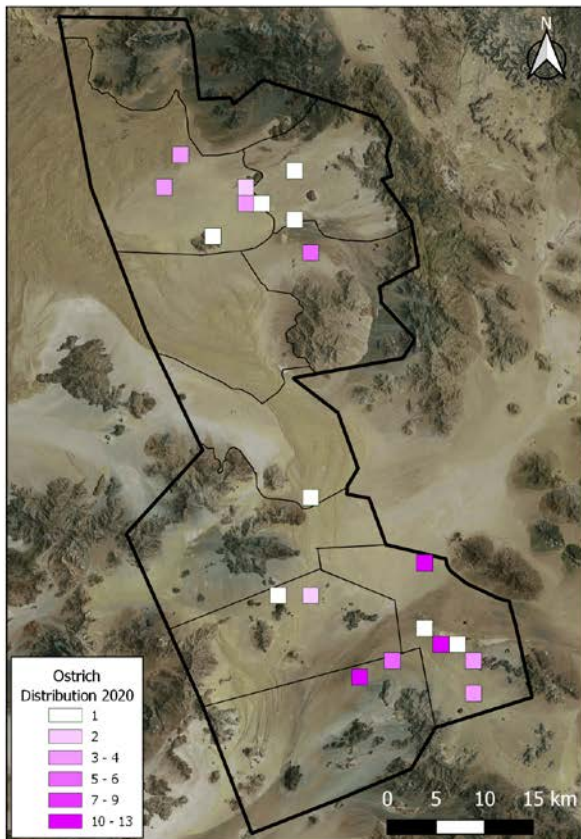




Figure 4.11 Distribution of Hartebeest



Figure 4.12 Density of Hartebeest

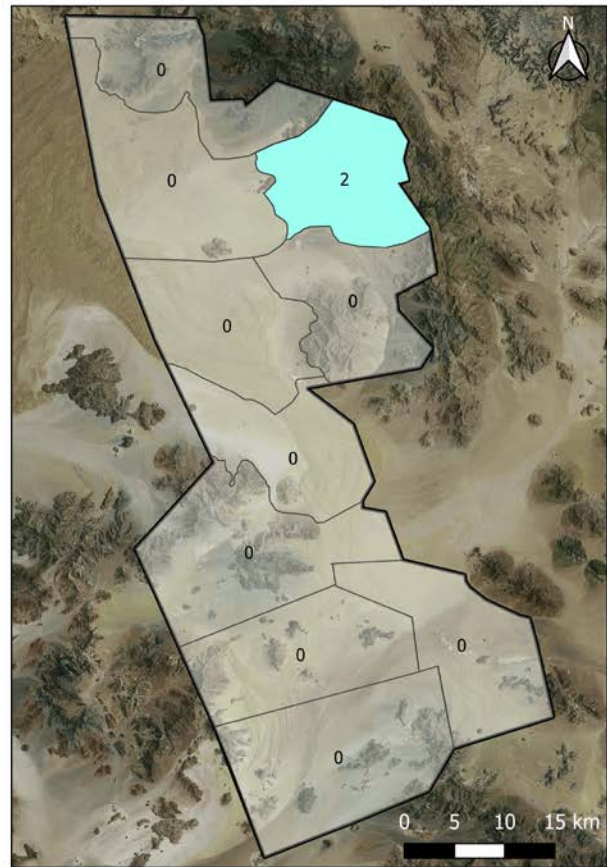


Figure 4.13 Distribution of Rüppel's korhaan

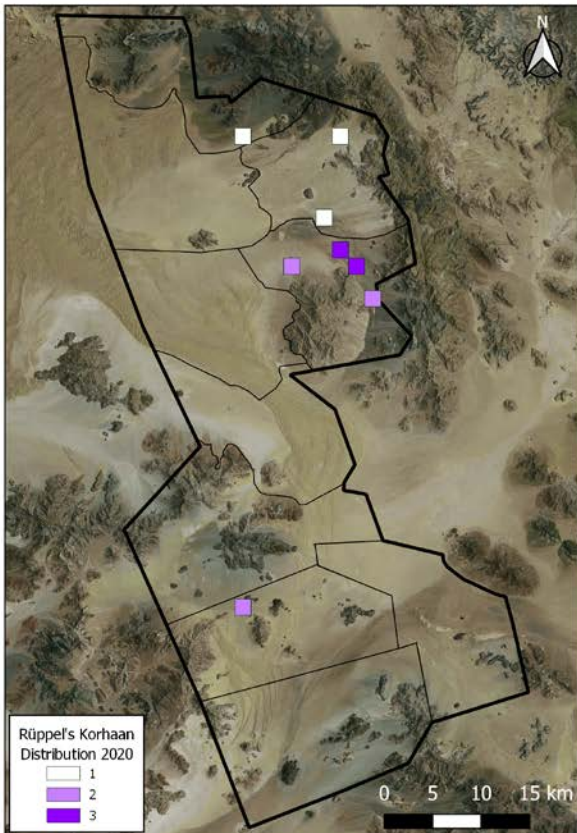


Figure 4.14 Density of Rüppel's korhaan

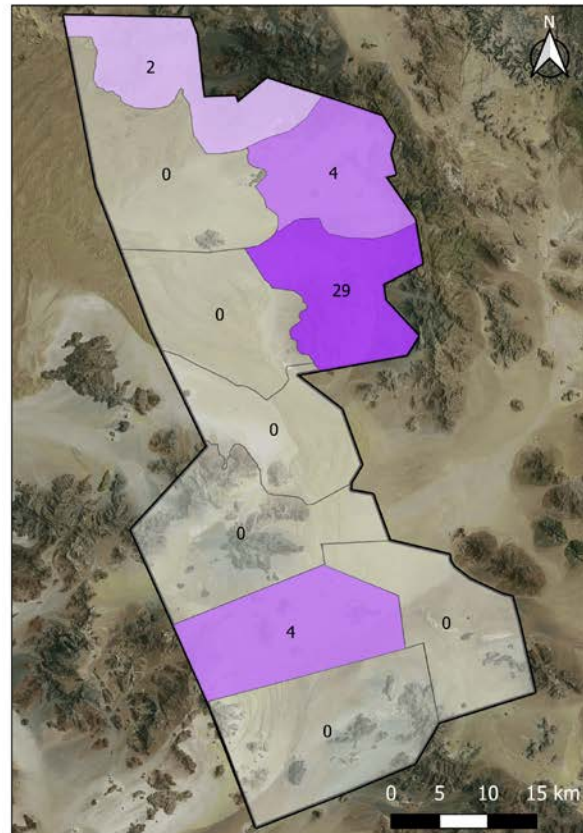


Figure 4.15 Distribution of Ludwig bustard

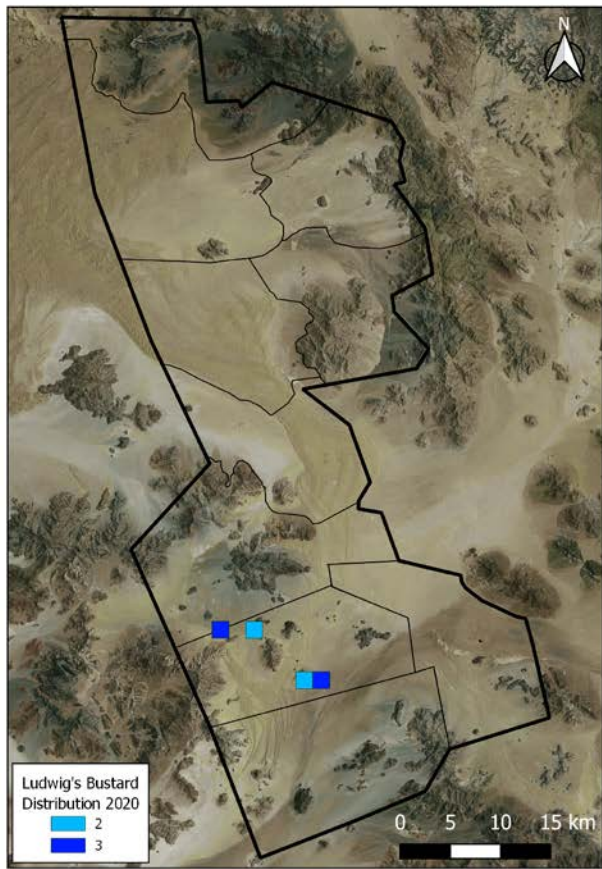


Figure 4.16 Density of Ludwig bustard





The population densities and actual number seen for individual species per zone are shown in tables 7.1-7.7 below.

Table 7.1

<b>Gemsbok</b>			
<b>Route</b>	<b>Route length</b>	<b>Actual number seen</b>	<b>Density</b>
1	47	8	17
2	52	76	146
3	60.7	107	176
4	43	8	19
5	70	32	46
6	35	93	266
7	55	111	202
8	50	38	76
9	52	76	146
10	59	3	5
<b>Total</b>	<b>523.7</b>	<b>552</b>	<b>105</b>

Table 7.2

<b>Springbok</b>			
<b>Route</b>	<b>Route length</b>	<b>Actual number seen</b>	<b>Density</b>
1	47	5	11
2	52	12	23
3	60.7	222	366
4	43	0	0
5	70	0	0
6	35	19	54
7	55	177	322
8	50	3	6
9	52	128	246
10	59	5	8
<b>Total</b>	<b>523.7</b>	<b>571</b>	<b>109</b>

Table 7.3

<b>Ostrich</b>			
<b>Route</b>	<b>Route length</b>	<b>Actual number seen</b>	<b>Density</b>
1	47	0	0
2	52	1	2
3	60.7	14	23
4	43	0	0
5	70	1	1
6	35	7	20
7	55	0	0
8	50	3	6
9	52	33	63
10	59	17	29
<b>Total</b>	<b>523.7</b>	<b>76</b>	<b>15</b>

Table 7.4

<b>Burchell's zebra</b>			
<b>Route</b>	<b>Route length</b>	<b>Actual number seen</b>	<b>Density</b>
1	47	0	0
2	52	45	87
3	60.7	0	0
4	43	0	0
5	70	0	0
6	35	50	143
7	55	27	49
8	50	11	22
9	52	19	37
10	59	0	0
<b>Total</b>	<b>523.7</b>	<b>152</b>	<b>29</b>

Table 7.5

Red Hartebeest			
Route	Route length	Actual number seen	Density
1	47	0	0
2	52	1	2
3	60.7	0	0
4	43	0	0
5	70	0	0
6	35	0	0
7	55	0	0
8	50	0	0
9	52	0	0
10	59	0	0
<b>Total</b>	<b>523.7</b>	<b>1</b>	<b>0</b>

Table 7.6

Ruppell's korhaan			
Route	Route length	Actual number seen	Density
1	47	1	2
2	52	2	4
3	60.7	0	0
4	43	0	0
5	70	0	0
6	35	10	29
7	55	0	0
8	50	2	4
9	52	0	0
10	59	0	0
<b>Total</b>	<b>523.7</b>	<b>15</b>	<b>3</b>

Table 7.7

Ludwig's bustard			
Route	Route length	Actual number seen	Density
1	47	0	0
2	52	0	0
3	60.7	0	0
4	43	0	0
5	70	0	0
6	35	0	0
7	55	0	0
8	50	10	20
9	52	0	0
10	59	0	0
<b>Total</b>	<b>523.7</b>	<b>10</b>	<b>2</b>

The total wildlife density for all game species (including Ludwig’s Bustard and Ruppel’s Korhaan) combined in each count zone for May 2020 is shown in Table 8 below, and the percentage distribution in each zone is shown in Figure 5 that follows.

Table 8. Total number of animals counted per 100km for each route in 2020.

Total no of animals counted per 100 km per route			
Route	Route length (km)	No of animals counted/100km	% of total animals counted per 100km
1	47	15	1%
2	52	142	10%
3	60.7	354	25%
4	43	8	1%
5	70	35	2%
6	35	182	13%
7	55	320	22%
8	50	75	5%
9	52	269	19%
10	59	25	2%
<b>Total</b>	<b>523.7</b>	<b>1425</b>	

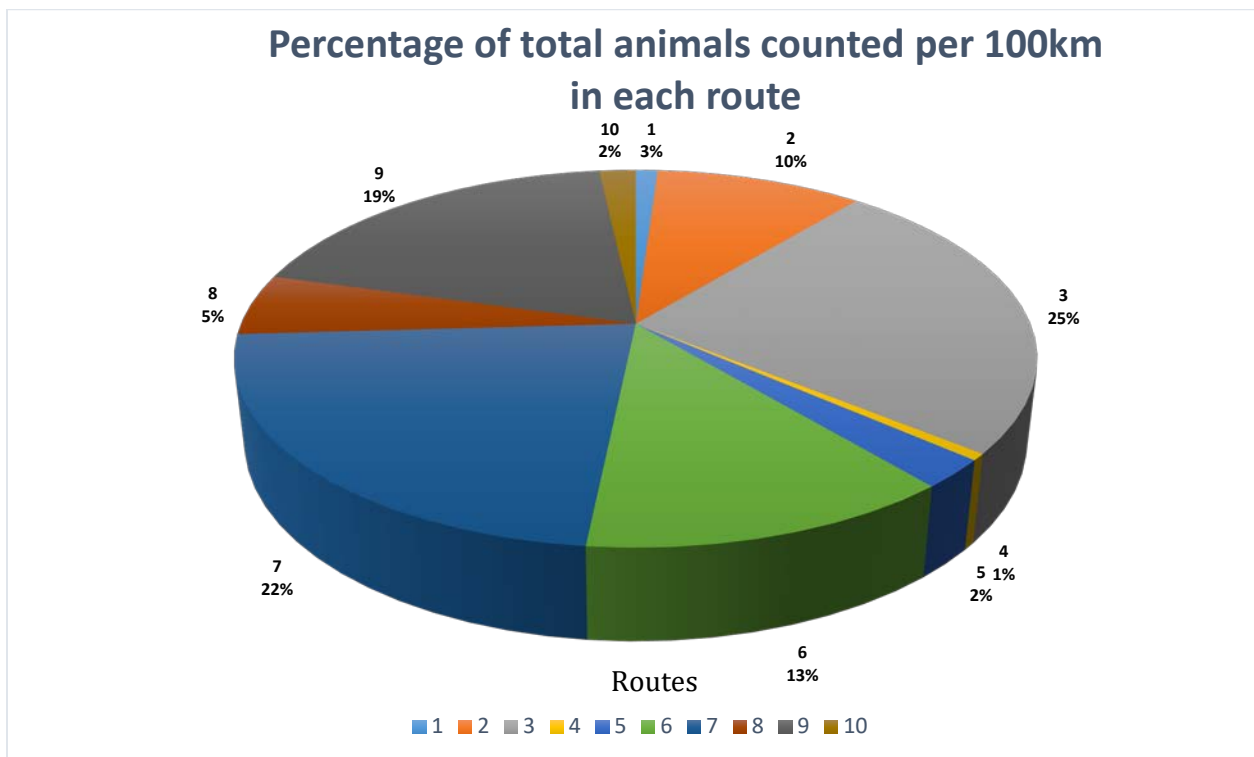


Figure 5. Population density percentages throughout the count area.

The total wildlife density for all species (including Ludwig’s Bustard and Ruppel’s Korhaan) combined per count zone in May 2018, compared to May 2019 and May 2020, is shown in Table 9 below.

Table 9. Total number of animals counted per 100km for each route in 2020 compared to 2019 and 2018.

<b>Total no of animals counted per 100 km per route (May 2018 - May 2020)</b>				
<b>Route</b>	<b>May-18</b>	<b>May-19</b>	<b>May-20</b>	<b>% change (May-19 to May-20)</b>
<b>1</b>	76	131	15	-88.51%
<b>2</b>	224	286	142	-50.40%
<b>3</b>	279	121	354	191.90%
<b>4</b>	409	480	8	-98.33%
<b>5</b>	381	710	35	-95.07%
<b>6</b>	306	243	182	-25.06%
<b>7</b>	469	316	320	1.15%
<b>8</b>	198	518	75	-85.52%
<b>9</b>	302	233	269	15.60%
<b>10</b>	186	177	25	-85.90%
<b>Total</b>	<b>2830</b>	<b>3215</b>	<b>1425</b>	<b>-55.68%</b>

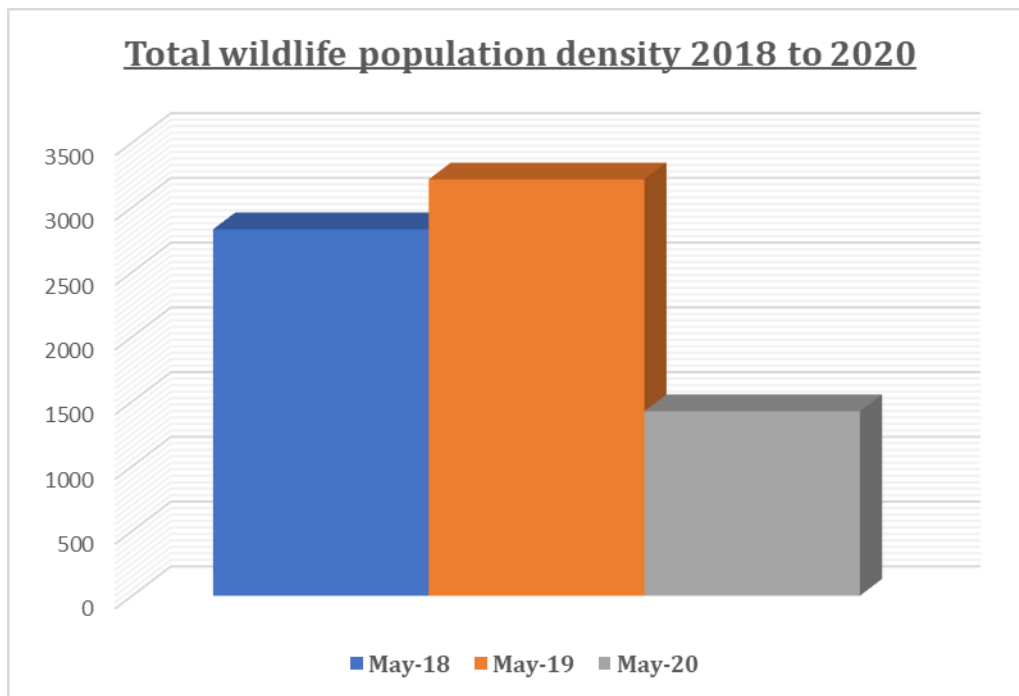


Figure 6. Total wildlife density change from 2018-2020.

### Objective 3: Population change

The total estimated numbers of game for the May 2019 count is compared to those from previous years to illustrate the population change, and are shown in Tables 10 and 11 below. The overall population estimate has increased by 43% and the number of animals counted per 100km per route has increased by 38.42%.

Table 10. Population estimates for 2020 compared to 2019.

Total estimated numbers of game (Zone 1-10; May 2019 - May 2020)					
Species	May-19		May-20		Percentage change
	No. Counted	Total estimated number	No. Counted	Total estimated number	
Gemsbok	1026	3480	552	6758	94.19%
Springbok	267	1351	571	8981	564.75%
Kudu	0	0	0	0	#DIV/0!
Steenbok	0	0	0	0	#DIV/0!
Ostrich	65	175	76	1293	638.60%
Ludwigs Bustard	21	192	10	168	#DIV/0!
Ruppel's Korhaan	24	293	15	984	235.97%
B. zebra	307	485	152	1943	300.53%
Hartebeest	16	66	3	8	-88.29%
<b>Total</b>	<b>1726</b>	<b>5850</b>	<b>1379</b>	<b>20134</b>	<b>244.17%</b>
Giraffe	10	10	10	10	0.00%

The long-term total population estimates are presented in the table below.

Table 11. Population estimates for years 2010-2020.

Total estimated numbers of game (Jun 2010 - May 2020)											
Species	Jun-10 (1-9)	Jun-11 (1-9)	Jun-12 (1-10)	Jun-13 (1-10)	May-14 (1-10)	May-15 (1-10)	May-16 (1-10)	May-17 (1-10)	May-18 (1-10)	May-19 (1-10)	May-20 (1-10)
Gemsbok	3972	6696	7493	8112	9087	7447	6650	10625	3699	3480	6758
Springbok	7359	9968	6225	5828	3024	3420	2944	3243	1720	1351	8981
Kudu	10	15	16	5	0	7	0	4	0	0	0
Steenbok	0	0	0	0	0	0	0	0	0	0	0
Ostrich	448	365	748	183	220	218	145	226	130	175	1293
Ludwigs Bustard	693	286	285	381	247	119	92	222	0	192	168
Ruppel's Korhaan	210	335	468	388	229	145	362	234	119	293	984
B. zebra*	350	370	470	320	352	367	510	509	329	485	2058
Hartebeest*	110	125	177	204	197	220	149	174	67	66	0
Giraffe*	8	6	6	6	7	7	9	9	9	10	10
<b>Total population estimate</b>	<b>13160</b>	<b>18166</b>	<b>15888</b>	<b>15427</b>	<b>13363</b>	<b>11950</b>	<b>10861</b>	<b>15246</b>	<b>6073</b>	<b>6052</b>	<b>20252</b>

Blesbok*	19	18	7	3	0	0	0	0	0	0	0
% change	-28,83%	38,04%	12,54%	-2,90%	-13,38%	-10,57%	-9,11%	40,37%	-60,17%	-0,35%	234,63%

The graphs in figure 7.1-7.4 below, show the total long term individual estimate changes for the four most common species. Please note that the figures of these graphs are taken from the respective species estimates from the maximum number of routes counted in each year.

Figure 7.1

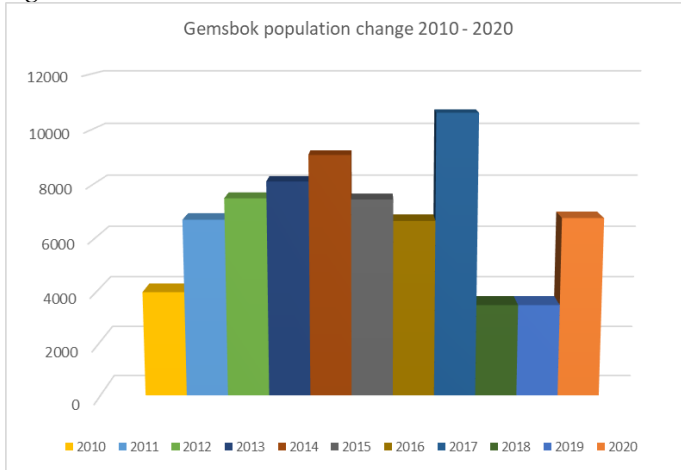


Figure 7.2

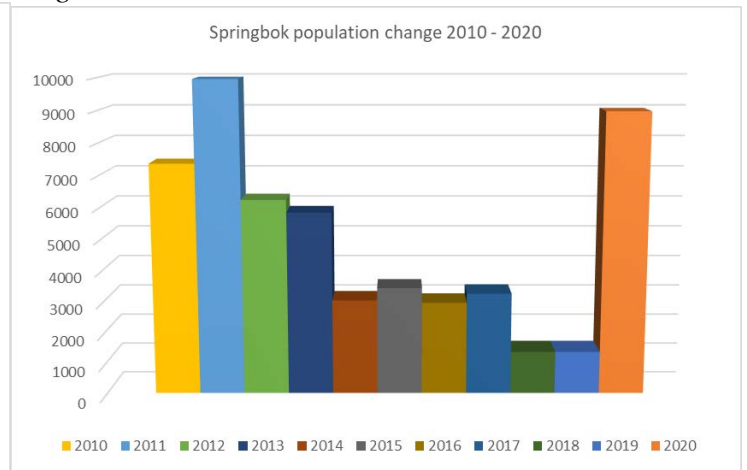


Figure 7.3

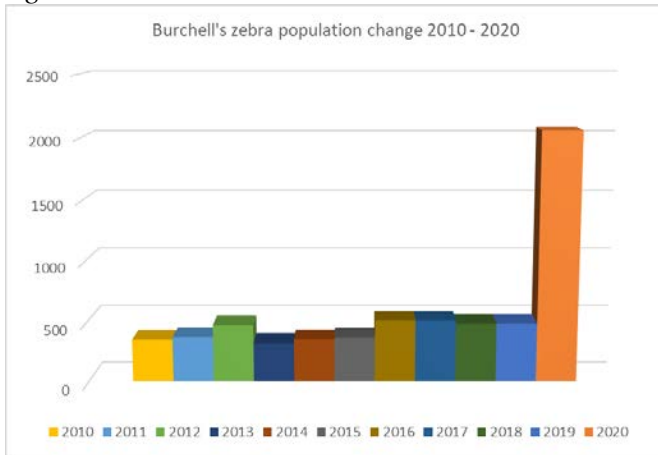
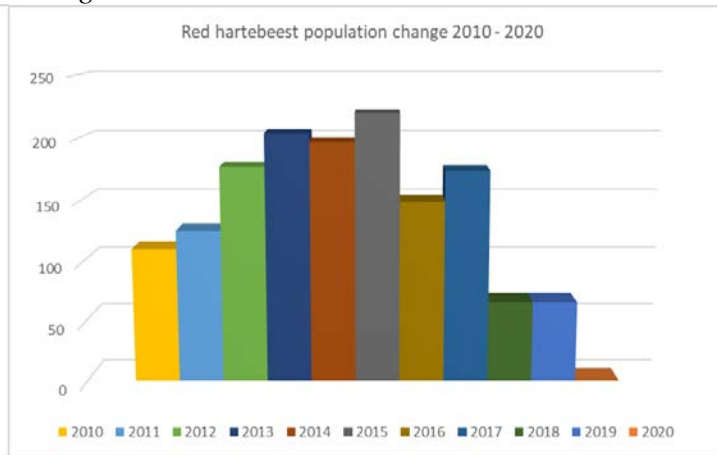


Figure 7.4

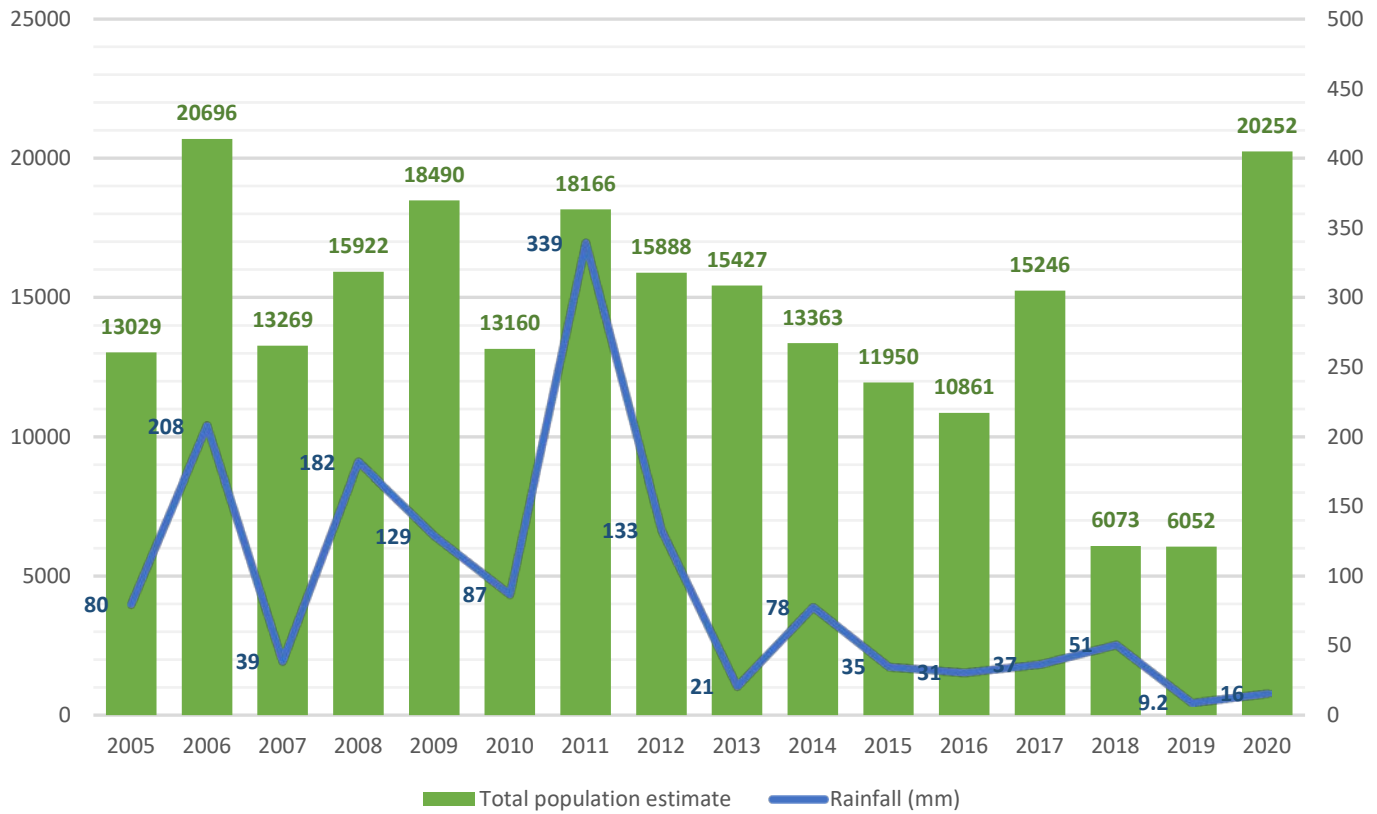


The graph in Figure 8 below shows long term total population estimate change compared to the average annual rainfall received for the same period. Please note that as with the previous graphs, the figure for this graph was taken from the total population estimates and from the maximum number of routes counted in each year.

Figure 8. Total population change 2005 to 2020 compared to average rainfall.



## Total population change 2005 - 2022 compared to rainfall



## 5. Discussion and conclusions

### **Gemsbok**

Interestingly the number of actual gemsboks seen was lower than than the previous year, the estimated population was higher. This can happen if the animals were closer to the road and therefore easier to see and be certain of the total numbers in each herd. When the species correction factor is applied there is no accounting for any observation error and the estimated population is closer to the actual number counted.

The results of the 2020 gemsbok population estimate show an increase of 94.19% (6758 gemsbok) from last year's estimate (3480 gemsbok).

The highest density of gemsbok was recorded in Zone 6, which had a total of 266 gemsbok per 100 km. The second highest density of gemsbok was in Zone 7 (202 gemsbok per 100 km). The gemsbok was found in every zone of the reserve.

### **Springbok**

The springbok numbers were higher than the previous year, and the so is the population estimate. The estimated number of springboks for this year is 8981, with an increase of 564.75% from last year of 1351. This would be the same reason as with gemsbok, animals closer to the road.

The springbok was predominantly concentrated in Zones 3, 7 and 9. No springbok was recorded for zone 4 and 5. In the other zones significant smaller number of springboks was recorded compared to zone 3, 7 and 9.

### **Ostrich**

This year's ostrich population estimate is 1293. This is an 638.60% increase from last year's population estimate of 175. Most of the sightings were in Zone 9 (33 ostrich), same as the previous year followed by zones 10, 3 and 6.

### **Burchell's Zebra**

This year, a total of 152 zebra were counted to give a total estimated population of 2058. They were only counted in zone 2, 6,7,8 and 9, with zone 6 have the highest density compared to the other zones.

### **Red Hartebeest**

They were only seen one hartebeest seen in zone 2, compared to last year when 16 were counted. This is a decrease of 93.31%.

### **Giraffe**

There were three giraffes sighted during this year's game count in route 6. However, with regular sightings there are 10 giraffes on the reserve.

## 6. Acknowledgments

The NamibRand Nature Reserve would like to thank all of its concessionaires, stakeholders, neighbors and participants for their enthusiastic involvement to make this year's game count another success.

This year's participants were:

Murray Tindall, Norman, Nils Odendaal, Danica Shaw, Erich Simon, Gert Tsaobeb, Willem Hanse, Amushe Tobias, Michael Kanyanga, Jonas Ndeuludila, Mupiri Thadeus, Salom Haiduwa, Simon Rooi, Abraham Tsaobeb, Thomas Soutschka, Kerstin Klein, Di Wucher, Dierind Basson, Marius Basson, Elizabeth Johannes, Ruben Bonifacio, Martin Verwey, Marlise Verwey, Wian Boshoff, Ettinne, Sanet, Rossouw, Elton Vries, Johannes Benisius, Zazapamue Hange, Abraham Hantenya

## 7. Appendix

### Results per count route per zone

Tables 12.1 to 12.11 list the data collected on each route in May 2019, which were used as a basis for the analysis.

Table 12.1

Route 1				
Species	Route length	Total number counted	Density	Estimated population
Oryx	47	8	17	42
Springbok	47	5	11	29
Plains Zebra	47			
Hartebeest	47			
Kudu	47			
Ostrich	47			
Rüppel Korhaan	47	1	2	22
Ludwig Bustard	47			
<b>Total</b>	<b>47</b>	<b>14</b>	<b>30</b>	<b>94</b>
Black-backed Jackel*	47	1	2	13

\*Not included in count

Table 12.2

Route 2				
Species	Route length	Total number counted	Density	Estimated population
Oryx	52	76	146	585
Springbok	52	12	23	85
Plains Zebra	52	45	87	253
Hartebeest	52	1	2	4
Kudu	52			
Ostrich	52	1	2	3
Rüppel Korhaan	52	2	4	42
Ludwig Bustard	52			
<b>Total</b>	<b>52</b>	<b>137</b>	<b>263</b>	<b>973</b>
Lappet-faced Vulture*	52	3	6	20

\*Not included in count

Table 12.3

<b>Route 3</b>				
Species	Route length	Total number counted	Density	Estimated population
Oryx	60.7	107	176	1083
Springbok	60.7	222	366	2684
Plains Zebra	60.7			
Hartebeest	60.7			
Kudu	60.7			
Ostrich	60.7	14	23	140
Rüppel Korhaan	60.7			
Ludwig Bustard	60.7			
<b>Total</b>	<b>60.7</b>	<b>343</b>	<b>565</b>	<b>3908</b>
Black-backed Jackel*	60.7	3	5	119
Bat-eared Fox*	60.7	6	10	65
Greater Kestrel*	60.7	2	3	87

\*Not included in count

Table 12.4

<b>Route 4</b>				
Species	Route length	Total number counted	Density	Estimated population
Oryx	43	8	19	100
Springbok	43			
Plains Zebra	43			
Hartebeest	43			
Kudu	43			
Ostrich	43			
Rüppel Korhaan	43			
Ludwig Bustard	43			
<b>Total</b>	<b>43</b>	<b>8</b>	<b>19</b>	<b>100</b>

Table 12.5

<b>Route 5</b>				
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Species	Route length	Total number counted	Density	Estimated population
Oryx	70	32	46	135
Springbok	70			
Plains Zebra	70			
Hartebeest	70			
Kudu	70			
Ostrich	70	1	1	4
Rüppel Korhaan	70			
Ludwig Bustard	70			
<b>Total</b>	<b>70</b>	<b>33</b>	<b>47</b>	<b>139</b>
Lappet-faced Vulture*	70	1	1	12
Black-backed Jackel*	70	1	1	125

\*Not included in count

Table 12.6

<b>Route 6</b>				
Species	Route length	Total number counted	Density	Estimated population
Oryx	35	93	266	1339
Springbok	35	19	54	305
Plains Zebra	35	50	143	836
Hartebeest	35			
Kudu	35			
Ostrich	35	7	20	77
Rüppel Korhaan	35	10	29	534
Ludwig Bustard	35			
<b>Total</b>	<b>35</b>	<b>179</b>	<b>511</b>	<b>3091</b>

Table 12.7

Route 7				
Species	Route length	Total number counted	Density	Estimated population
Oryx	55	111	202	1086
Springbok	55	177	322	1702
Plains Zebra	55	27	49	116
Hartebeest	55			
Warthog	55			
Kudu	55			
Ostrich	55			
Rüppel Korhaan	55			
Ludwig Bustard	55			
<b>Total</b>	<b>55</b>	<b>315</b>	<b>573</b>	<b>2904</b>
Black-backed Jackel*	55	1	2	1712
Bat-eared Fox*	55	3	5	103

\*Not included in count

Table 12.8

Route 8				
Species	Route length	Total number counted	Density	Estimated population
Oryx	50	38	76	182
Springbok	50	3	6	12
Plains Zebra	50	11	22	152
Hartebeest	50			
Kudu	50			
Ostrich	50	3	6	17
Rüppel Korhaan	50	2	4	386
Ludwig Bustard	50	10	20	168
<b>Total</b>	<b>50</b>	<b>67</b>	<b>134</b>	<b>916</b>
Black-backed Jackel*	50	3	6	135
Bat-eared Fox*	50	5	10	96

\*Not included in count

Table 12.9

Route 9				
Species	Route length	Total number counted	Density	Estimated population
Oryx	52	76	146	2144
Springbok	52	128	246	4127
Plains Zebra	52	19	37	702
Hartebeest	52			
Kudu	52			
Ostrich	52	33	63	859
Rüppel Korhaan	52			
Ludwig Bustard	52			
<b>Total</b>	<b>52</b>	<b>256</b>	<b>492</b>	<b>7832</b>
Lappet-faced Vulture	52	6	12	183
Bat-eared Fox	52	7	13	569

\*Not included in count

Table 12.10

Route 10				
Species	Route length	Total number counted	Density	Estimated population
Oryx	59	3	5	61
Springbok	59	5	8	36
Plains Zebra	59			
Hartebeest	59			
Kudu	59			
Ostrich	59	17	29	193
Rüppel Korhaan	59			
Ludwig Bustard	59			
<b>Total</b>	<b>59</b>	<b>25</b>	<b>42</b>	<b>290</b>



Table 12.11

Total number of game				
Species	Route length	Total number counted	Density	Estimated population
Oryx	552	552	100.00	6758
Springbok	552	571	103.44	8981
Plains Zebra	552	152	27.54	2058
Hartebeest	552	1	0.18	4
Kudu	552			
Ostrich	552	76	13.77	1293
Rüppel Korhaan	552	15	2.72	984
Ludwig Bustard	552	10	1.81	168
<b>Total</b>	<b>552</b>	<b>1377</b>	<b>249.46</b>	<b>20242</b>
Lappet-faced Vulture*	552	11	1.99	215
Greater Kestrel*	552	2	0.36	87
Black-backed Jackel*	552	9	1.63	2104
Bat-eared Fox*	552	23	4.17	833

\*Not included in count