NamibRand
Nature Reserve
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Results of the
NamibRand Nature Reserve
and Pro-Namib Conservancy
Annual Game Count
25 May 2019

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Editorial input: Nils Odendaal – Chief Executive Officer

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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 25th of May 2019.

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.

2. Summary

Data collected in the May 2019 game count was entered into our database and analyzed. The results are shown below bearing our three core objectives in mind:

Objective 1: Population and biomass estimates:

Population estimates:

Table 1. Total number of game seen and the estimated numbers for May 2019.

Total estimated numbers of game (Zone 1-10; May 2019)		
Species	**No. Counted**	**Estimate 2019**
Gemsbok	1026	3480
Springbok	267	1351
Kudu	0	0
Steenbok	0	0
Ostrich	65	175
Ludwigs Bustard	21	192
Ruppel's Korhaan	24	293
B. zebra	307	485
Hartebeest	16	66
Total	**1726**	**6042**
Giraffe*	10	10

** Total numbers known*

Biomass estimates

Table 2. Wildlife biomass estimates for May 2019.

Total wildlife numbers and wildlife biomass on NamibRand for May 2019 (Zone 1-10) ; 224 209 ha)				
Species	**Mean mass (kg)**	**Estimated wildlife numbers from May 19 game count**	**Species biomass (kg)**	**Biomass per ha (kg)**
Gemsbok	220	3480	765600	4,10
Springbok	38	1351	51338	0,27
Kudu	180	0	0	0,00
Steenbok	11	0	0	0,00
Ostrich	68	175	11900	0,06
B. Zebra	300	485	145500	0,78
Hartebeest	130	66	8580	0,05
Total	**947**	**5557**	**5262479**	**5,26**

** Total (estimate) numbers known*

Objective 2: Wildlife distribution and density

Table 3. Total number of animals counted per 100km in each route and the respective density percentage per zone.

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	61,3	131	4%
2	51	286	9%
3	50,3	121	4%
4	45	480	15%
5	69	710	22%
6	35	243	8%
7	55	316	10%
8	56	518	16%
9	52	233	7%
10	53	177	6%
Total	**527,6**	**3215**	

Objective 3: Population change

Table 4. The overall population estimate has decreased by 3.05%

Total estimated numbers of game (Zone 1-10; May 2018 - May 2019)					
Species	**May-18**		**May-19**		**Percentage change**
	No. Counted	**Total estimated number**	**No. Counted**	**Total estimated number**	
Gemsbok	995	3699	1026	3480	-5,92%
Springbok	266	1720	267	1351	-21,45%
Kudu	0	0	0	0	0,00%
Steenbok	0	0	0	0	0,00%
Ostrich	54	130	65	175	34,62%
Ludwigs Bustard	0	0	21	192	0,00%
Ruppel's Korhaan	12	119	24	293	146,22%
B. zebra	172	497	307	485	-2,41%
Hartebeest	25	67	16	66	-1,49%
Total	**1524**	**6232**	**1726**	**6042**	**-3,05%**
Giraffe*	9	9	10	10	11,11%

** 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. area represented/route length = area correction factor. The respective effective strip width (ESW) values and transect width then determines the relevant species correction factors, i.e. transect width (1000m) divided by (ESW x 2) = 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 2019.

Count areas, area correction factors, effective strip widths and species correction factors

Route No.	Total area per zone (ha)	Area represented per route	Route distance (km)	Area correction factor	Species	Effective strip width (m)	Species correction factor
1	18 072	12 513	52	2,41	Gemsbok	392	1,28
					Springbok	328	1,52
2	18 310	13 779	52	2,65	Gemsbok	310	1,61
					Springbok	226	2,21
3	27 039	26 424	58	4,56	Gemsbok	463	1,08
					Springbok	193	2,59
4	21 038	20 996	47	4,47	Gemsbok	622	0,80
					Springbok	479	1,04
5	18 038	17 491	72	2,43	Gemsbok	540	0,93
					Springbok	325	1,54
6	19 352	11 589	34	3,41	Gemsbok	541	0,92
					Springbok	346	1,45
7	28 343	18 833	55	3,42	Gemsbok	509	0,98
					Springbok	263	1,90
8	22 452	19 291	52	3,71	Gemsbok	607	0,82
					Springbok	419	1,19
9	21 710	21 125	50	4,23	Gemsbok	400	1,25
					Springbok	436	1,15
10	29 855	24 721	59	4,20	Gemsbok	324	1,54
					Springbok	501	1,00
Total	224 209	186 762	531				

Species	Effective strip width (m) routes 1 - 10	Species correction factor (m) routes 1 - 10
Ostrich	667	0,75
Kudu	417	1,20
Steenbok	51	9,80
Ruppells korhaan	141	3,55
Ludwigs bustard	208	2,40

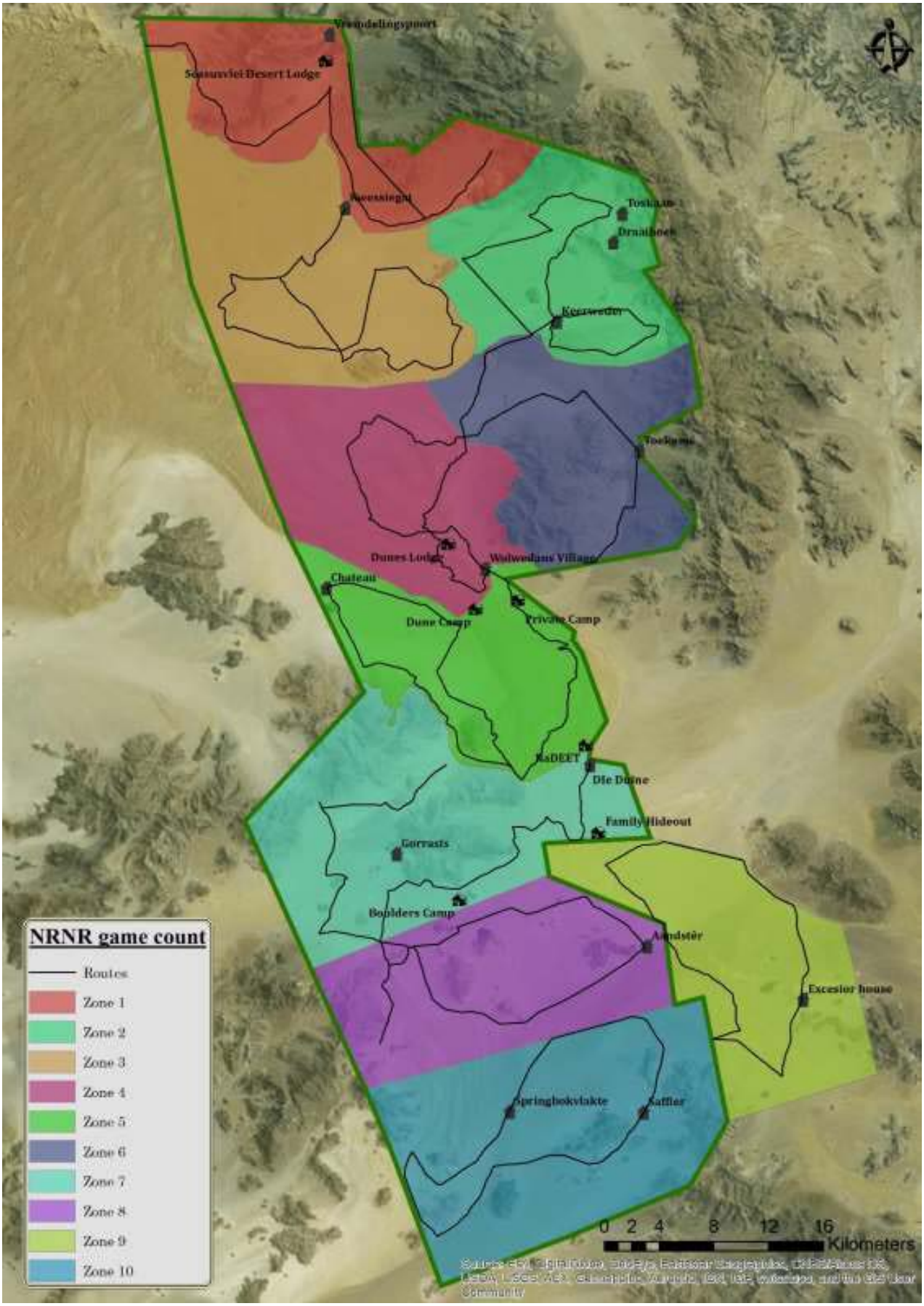


Figure 1. The game count area shows the ten zones used in May 2017 for the NamibRand Nature Reserve (1-8, 10) and the Pro-Namib Conservancy (9).

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.

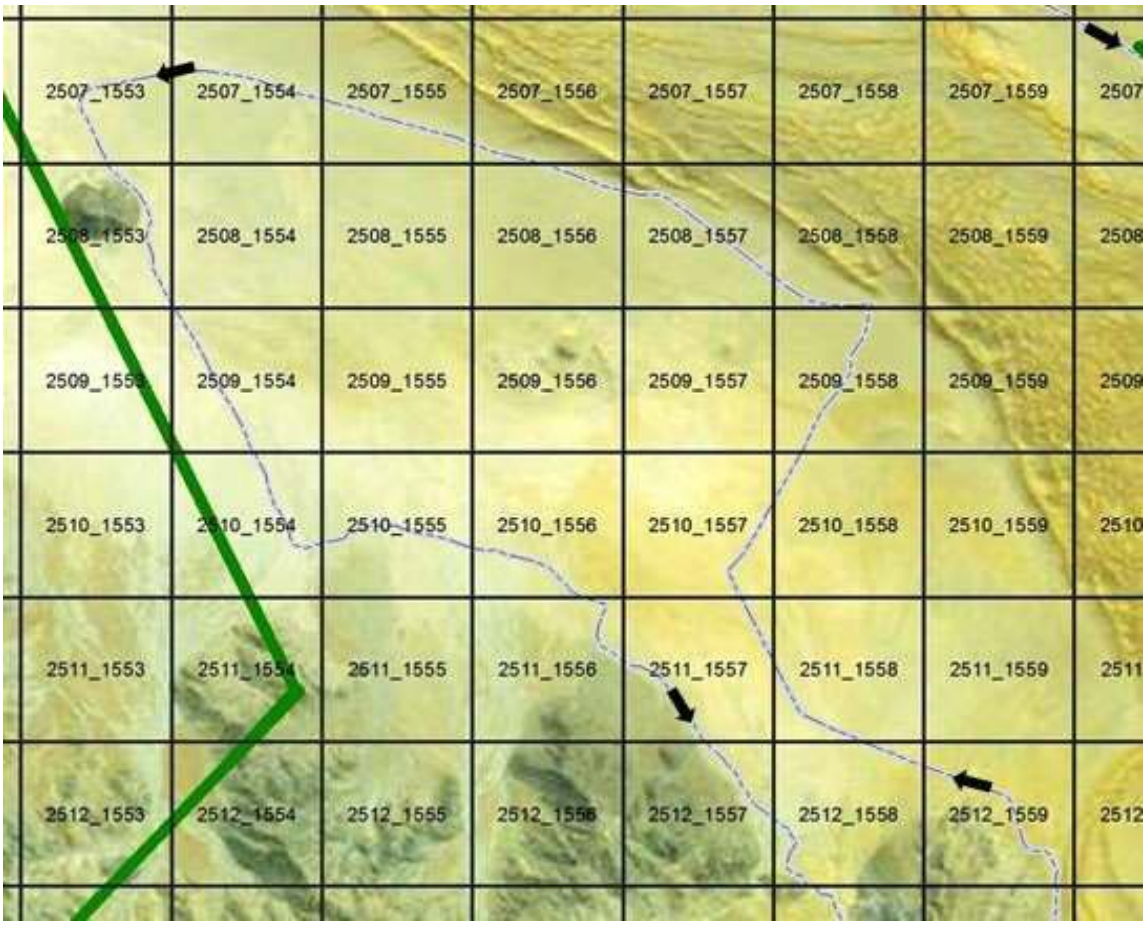


Figure 2. Monad maps.

4. Objectives and results of the May 2019 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 x A) x B=P

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 2019.

Total estimated numbers of game (Zone 1-10; May 2019)		
Species	**No. Counted**	**Estimate 2019**
Gemsbok	1026	3480
Springbok	267	1351
Kudu	0	0
Steenbok	0	0
Ostrich	65	175
Ludwigs Bustard	21	192
Ruppel's Korhaan	24	293
B. zebra	307	485
Hartebeest	16	66
Total	**1726**	**6042**
Giraffe*	9	9

** 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 x M) ÷ 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 2019.

Total wildlife numbers and wildlife biomass on NamibRand for May 2019 (Zone 1-10) ; 224 209 ha)				
Species	**Mean mass (kg)**	**Estimated wildlife numbers from May 19 game count**	**Species biomass (kg)**	**Biomass per ha (kg)**
Gemsbok	220	3480	765600	4,10
Springbok	38	1351	51338	0,27
Kudu	180	0	0	0,00
Steenbok	11	0	0	0,00
Ostrich	68	175	11900	0,06
B. Zebra	300	485	145500	0,78
Hartebeest	130	66	8580	0,05
Total	**947**	**5557**	**5262479**	**5,26**

** 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 2019.

Figure 3. Biomass composition 2019.

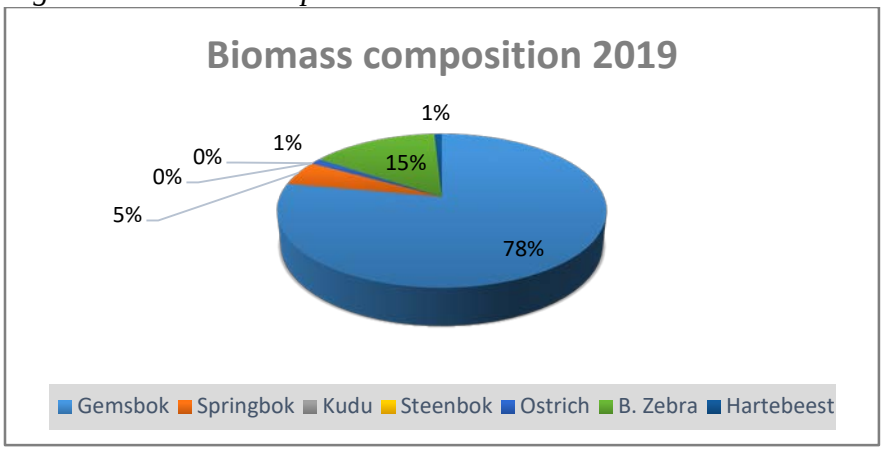


Table 6.2 Wildlife biomass (2019) percentage change compared to the count of May 2018.

Wildlife biomass on NamibRand for May 2018 and May 2019 (Zone 1-10) ; 224 209 ha)								
Wildlife species	Mean mass (kg)	May-18			May-19			
		Estimated wildlife numbers from May 2017 game count	Species Biomass (kg)	Biomass per ha (kg) TOTAL	Estimated wildlife numbers from May 2018 game count	Species Biomass (kg)	Biomass per ha (kg) TOTAL	Biomass percentage change
Gemsbok	220	3699	813780	4,36	3480	765600	4,10	**-5,92%**
Springbok	38	1720	65360	0,35	1351	51338	0,27	**-21,45%**
Kudu	180	0	0	0,00	0	0	0,00	**0.00%**
Steenbok	11	0	0	0,00	0	0	0,00	**0,00%**
Ostrich	68	130	8840	0,05	175	11900	0,06	**34,62%**
B. zebra	300	497	149100	0,80	485	145500	0,78	**-2,41%**
Red Hartebeest	130	67	8710	0,05	66	8580	0,05	**-1,49%**
Total		**6113**	**1045790**	**5,60**	**5557**	**982918**	**5,26**	**-6,01%**

Table 6.3 Wildlife biomass estimates from 2017-2019.

Total wildlife biomass estimates (kg/ha) on NamibRand May 2017 to May 2019					
Wildlife species	May-17	May-18	% change from May-17	May-19	% change from May 18
Gemsbok	10,70	4,36	*-59,28%*	4,10	*-5,92%*
Springbok	0,62	0,35	*-43,55%*	0,27	*-21,45%*
Kudu	0,00	0,00	*-100,00%*	0,00	*#DIV/0!*
Steenbok	0,00	0,00	*0,00%*	0,00	*0,00%*
Ostrich	0,08	0,05	*-40,83%*	0,06	*34,62%*
B. Zebra	0,57	0,80	*40,06%*	0,78	*-2,41%*
Hartebeest	0,14	0,05	*-66,67%*	0,05	*-1,49%*
Total	**12,1**	**5,6**	***-53,78%***	**5,3**	***-6,01%***

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

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).

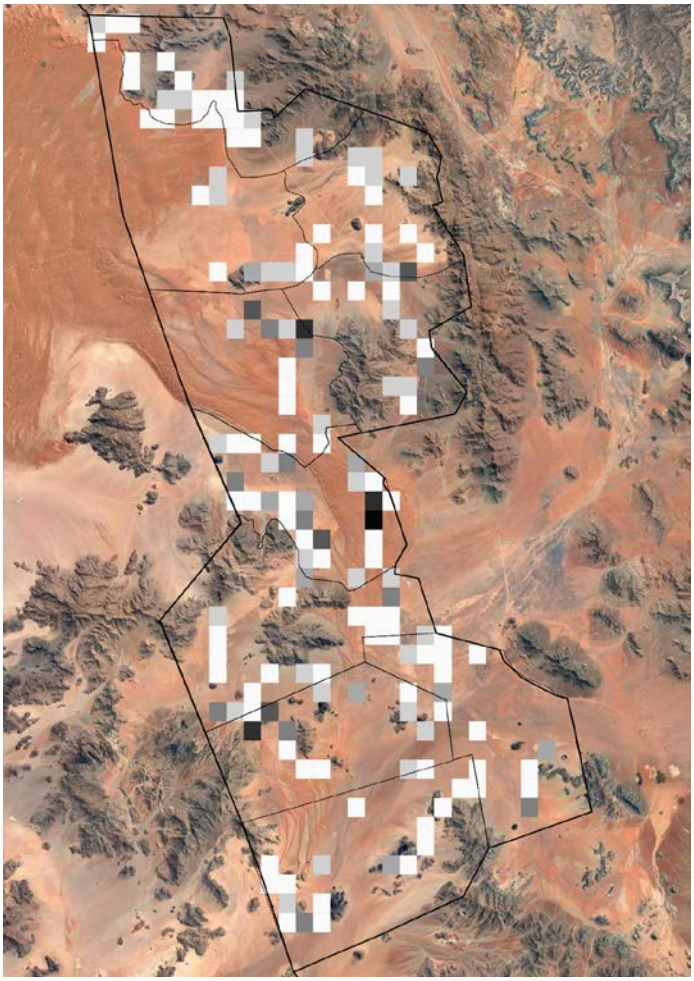


Figure 4.1 Total wildlife distribution

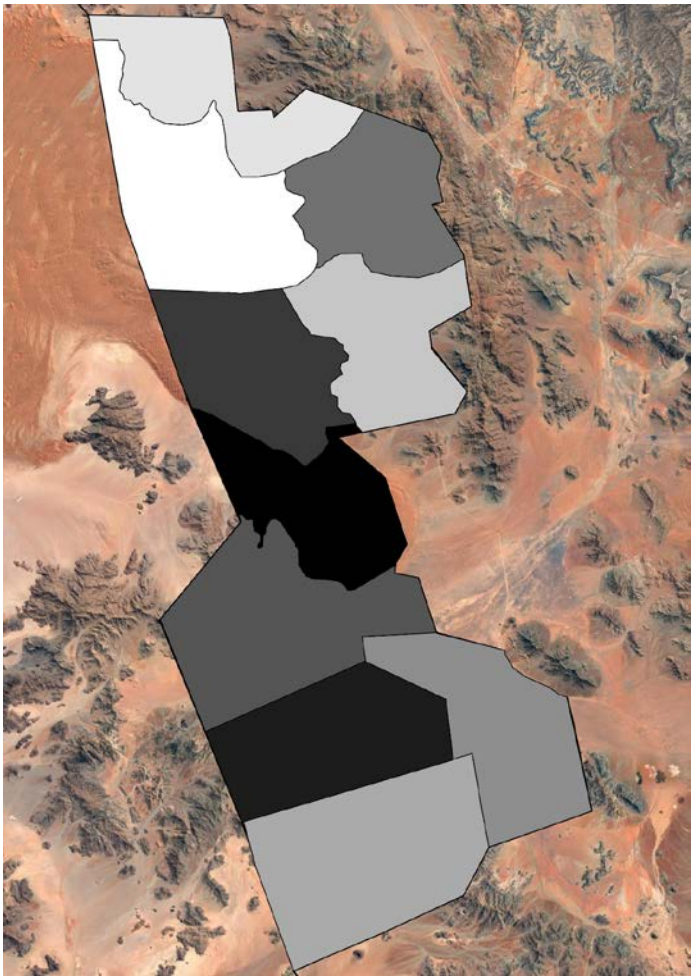


Figure 4.2 Total wildlife density

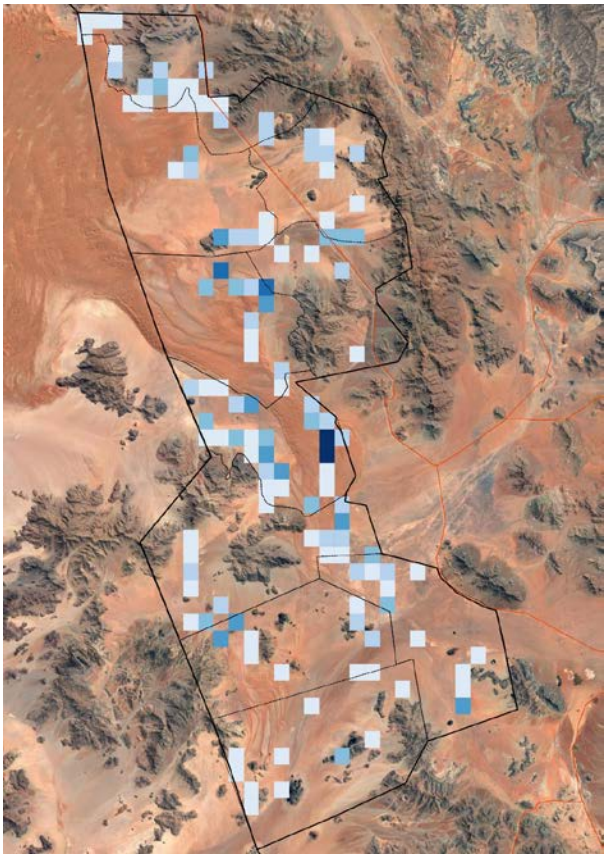


Figure 4.3 Distribution of gemsbok

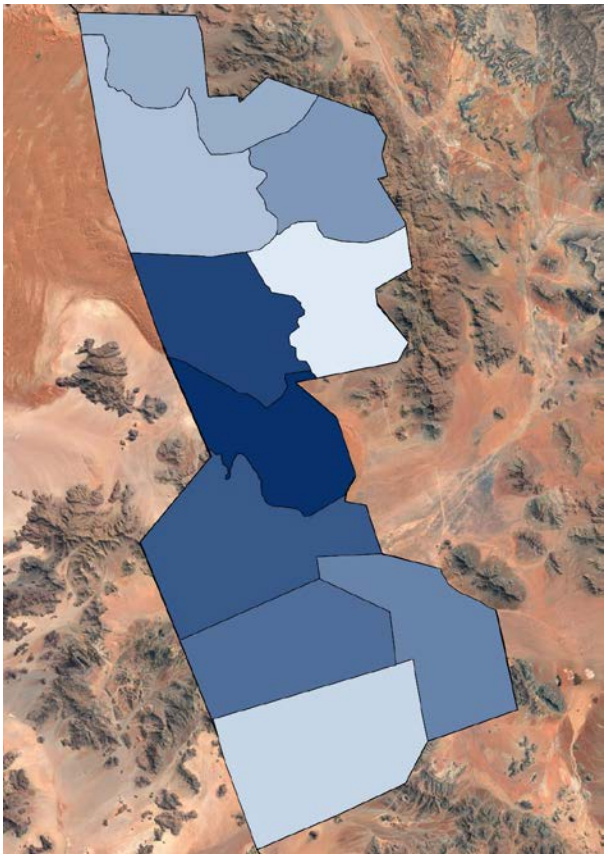


Figure 4.4 Density of gemsbok

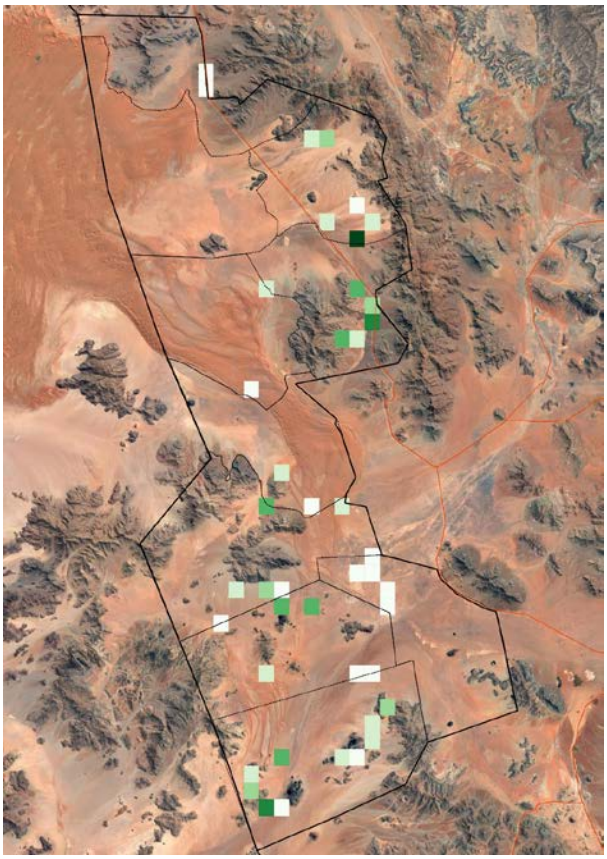


Figure 4.5 Distribution of springbok

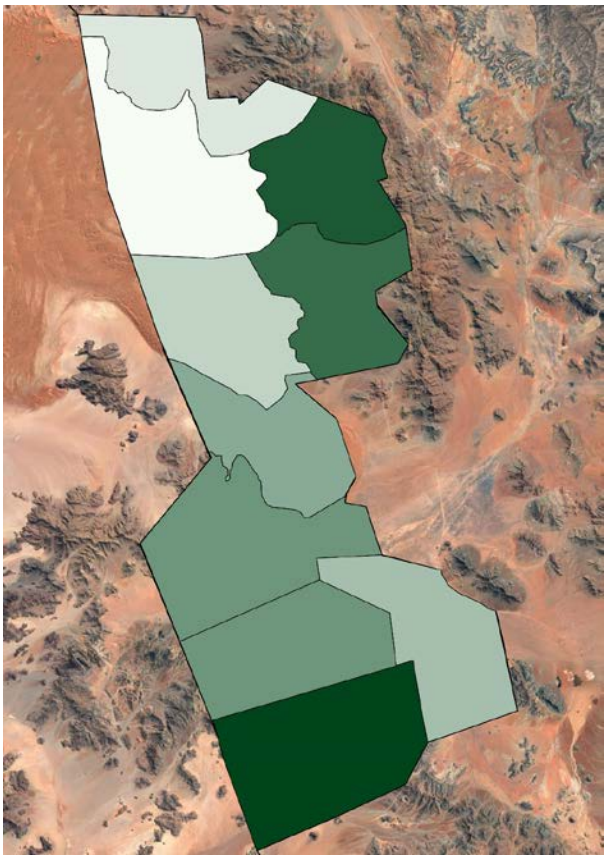


Figure 4.6 Density of springbok

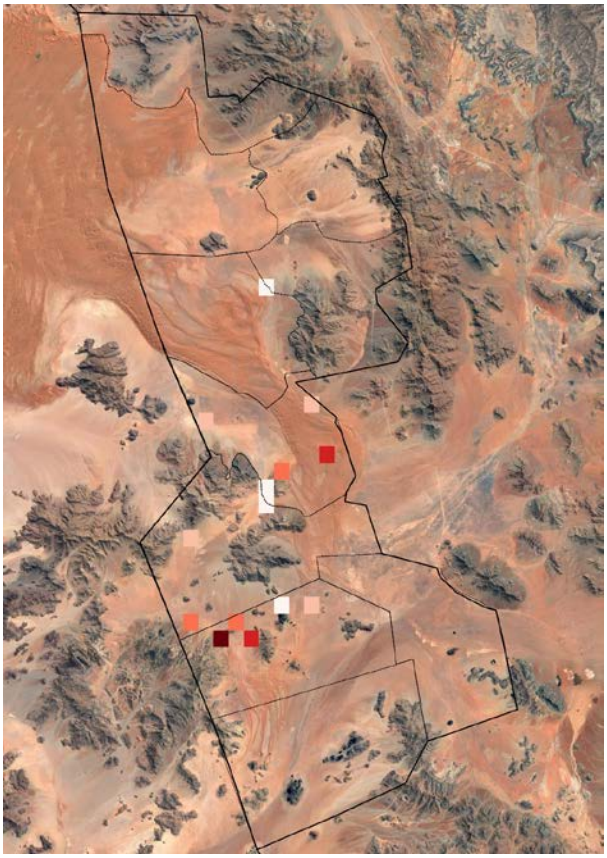


Figure 4.7 Distribution of B. zebra

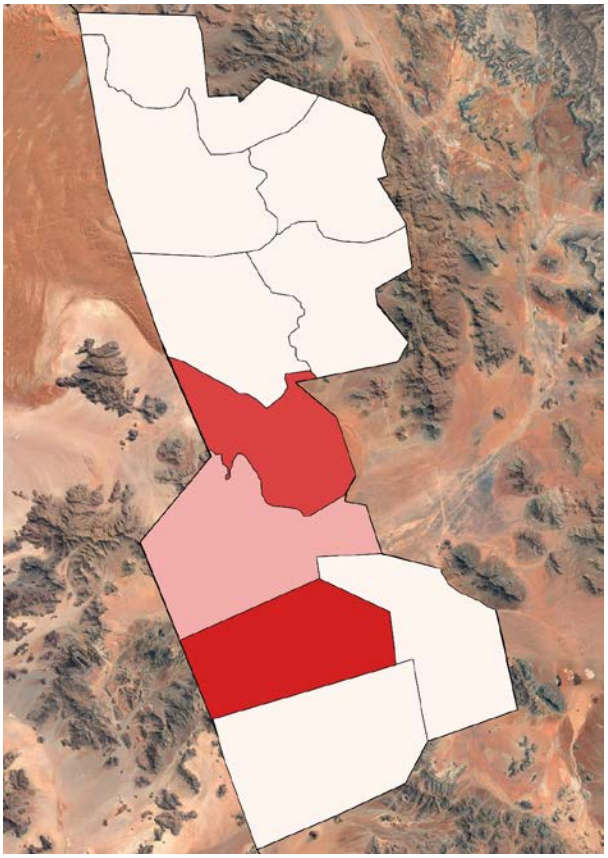


Figure 4.8 Density of B. Zebra

Figure 4.9 Distribution of ostrich

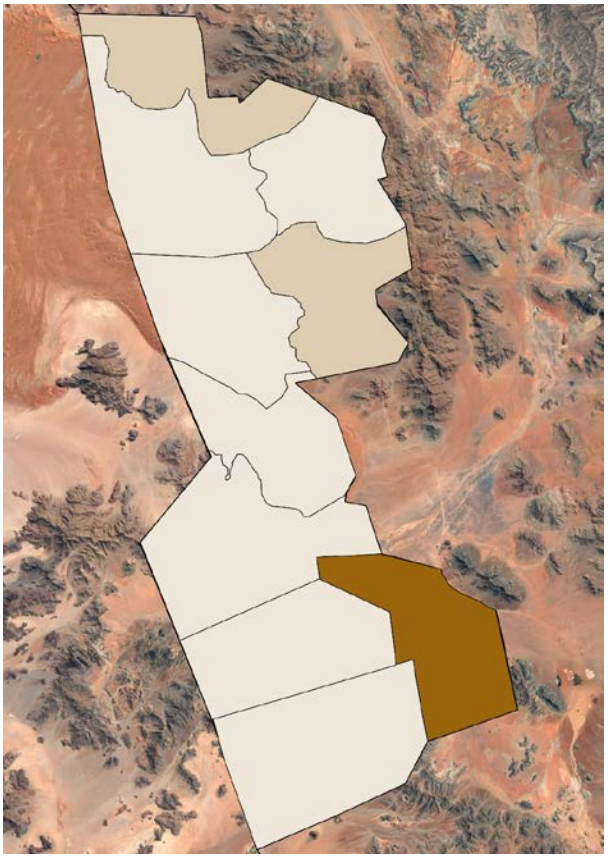


Figure 4.10 Density of ostrich

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

Table 7.1

Gemsbok			
Route	**Route length**	**Actual number seen**	**Density**
1	61,3	69	112,56
2	51	70	137,25
3	50,3	58	115,31
4	45	176	391,11
5	69	362	524,64
6	35	18	51,43
7	55	86	156,36
8	56	84	150,00
9	52	79	151,92
10	53	24	45,28
Total	**527,6**	**1026**	**194,47**

Table 7.2

Springbok			
Route	**Route length**	**Actual number seen**	**Density**
1	61,3	3	4,89
2	51	61	119,61
3	50,3	0	0,00
4	45	5	11,11
5	69	14	20,29
6	35	58	165,71
7	55	25	45,45
8	56	25	44,64
9	52	6	11,54
10	53	70	132,08
Total	**527,6**	**267**	**50,61**

Table 7.3

Ostrich			
Route	**Route length**	**Actual number seen**	**Density**
1	61,3	8	13,05
2	51	5	9,80
3	50,3	3	5,96
4	45	3	6,67
5	69	0	0,00
6	35	9	25,71
7	55	5	9,09
8	56	3	5,36
9	52	29	55,77
10	53	0	0,00
Total	**527,6**	**65**	**12,32**

Table 7.4

Burchell's zebra			
Route	**Route length**	**Actual number seen**	**Density**
1	61,3	0	0,00
2	51	0	0,00
3	50,3	0	0,00
4	45	6	13,33
5	69	103	149,28
6	35	0	0,00
7	55	58	105,45
8	56	140	250,00
9	52	0	0,00
10	53	0	0,00
Total	**527,6**	**307**	**58,19**

Table 7.5

Red Hartebeest			
Route	**Route length**	**Actual number seen**	**Density**
1	61,3	0	0,00
2	51	0	0,00
3	50,3	0	0,00
4	45	12	26,67
5	69	4	5,80
6	35	0	0,00
7	55	0	0,00
8	56	0	0,00
9	52	0	0,00
10	53	0	0,00
Total	**527,6**	**16**	**3,03**

Table 7.6

Ruppell's korhaan			
Route	**Route length**	**Actual number seen**	**Density**
1	61,3	0	0,00
2	51	2	3,92
3	50,3	0	0,00
4	45	4	8,89
5	69	7	10,14
6	35	0	0,00
7	55	0	0,00
8	56	6	10,71
9	52	5	9,62
10	53	0	0,00
Total	**527,6**	**24**	**4,55**

Table 7.7

Ludwig's bustard			
Route	**Route length**	**Actual number seen**	**Density**
1	61,3	0	0,00
2	51	8	15,69
3	50,3	0	0,00
4	45	10	22,22
5	69	0	0,00
6	35	0	0,00
7	55	0	0,00
8	56	1	1,79
9	52	2	3,85
10	53	0	0,00
Total	**527,6**	**21**	**3,98**

The total wildlife density for all game species (including Ludwig's Bustard and Ruppel's Korhaan) combined in each count zone for May 2019 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 2019.

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	61,3	131	4%
2	51	286	9%
3	50,3	121	4%
4	45	480	15%
5	69	710	22%
6	35	243	8%
7	55	316	10%
8	56	518	16%
9	52	233	7%
10	53	177	6%
Total	**527,6**	**3215**	

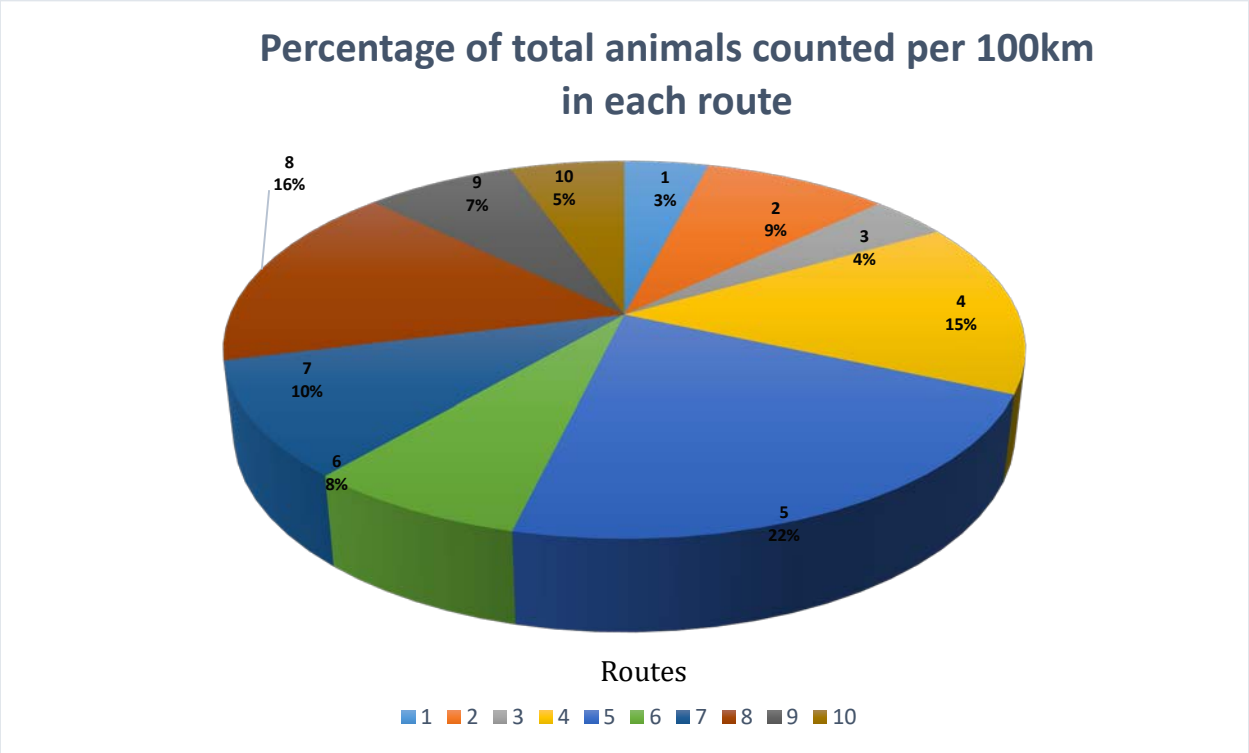


Figure 5. Population density percentages throughout the count area.

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

Table 9. Total number of animals counted per 100km for each route in 2019 compared to 2018 and 2017.

Total no of animals counted per 100 km per route (May 2017 - May 2019)				
Route	**May-17**	**May-18**	**May-19**	**% change (May-18 to May-19)**
1	293	76	131	71,72%
2	1775	224	286	27,80%
3	979	279	121	-56,53%
4	1589	409	480	17,36%
5	780	381	710	86,39%
6	1597	306	243	-20,63%
7	427	469	316	-32,55%
8	771	198	518	161,62%
9	277	302	233	-22,95%
10	91	186	177	-4,65%
Total	**588**	**281**	**327**	**16,42%**

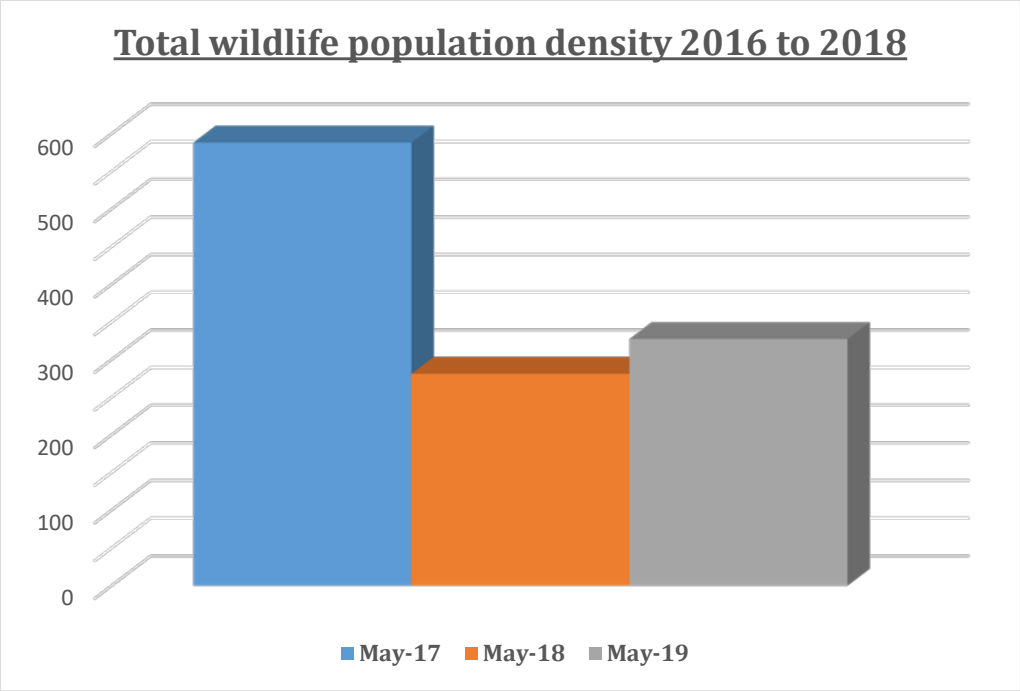


Figure 6. Total wildlife density change from 2017-2019.

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 2019 compared to 2018.

Total estimated numbers of game (Zone 1-10; May 2018 - May 2019)					
Species	**May-18**		**May-19**		**Percentage change**
	No. Counted	**Total estimated number**	**No. Counted**	**Total estimated number**	
Gemsbok	995	3699	1026	3480	-5,92%
Springbok	266	1720	267	1351	-21,45%
Kudu	0	0	0	0	0,00%
Steenbok	0	0	0	0	0,00%
Ostrich	54	130	65	175	34,62%
Ludwigs Bustard	0	0	21	192	0,00%
Ruppel's Korhaan	12	119	24	293	146,22%
B. zebra	172	497	307	485	-2,41%
Hartebeest	25	67	16	66	-1,49%
Total	**1524**	**6232**	**1726**	**6042**	**-3,05%**
Giraffe	9	9	10	10	11,11%

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

Table 11. Population estimates for years 2009-2019.

Total estimated numbers of game (Jun 2009 - May 2019)											
Species	**Jun-09 (1-9)**	**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)**
Gemsbok	5069	3972	6696	7493	8112	9087	7447	6650	10625	3699	3480
Springbok	11938	7359	9968	6225	5828	3024	3420	2944	3243	1720	1351
Kudu	31	10	15	16	5	0	7	0	4	0	0
Steenbok	40	0	0	0	0	0	0	0	0	0	0
Ostrich	733	448	365	748	183	220	218	145	226	130	175
Ludwigs Bustard	53	693	286	285	381	247	119	92	222	0	192
Ruppel's Korhaan	224	210	335	468	388	229	145	362	234	119	293
B. zebra*	318	350	370	470	320	352	367	510	509	329	485
Hartebeest*	80	110	125	177	204	197	220	149	174	67	66
Giraffe*	4	8	6	6	6	7	7	9	9	9	10
Total population estimate	**18490**	**13160**	**18166**	**15888**	**15427**	**13363**	**11950**	**10861**	**15246**	**6073**	**6052**
Blesbok*	23	19	18	7	3	0	0	0	0	0	0
% change	16,13%	-28,83%	38,04%	-12,54%	-2,90%	-13,38%	-10,57%	-9,11%	40,37%	-60,17%	-0,35%

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

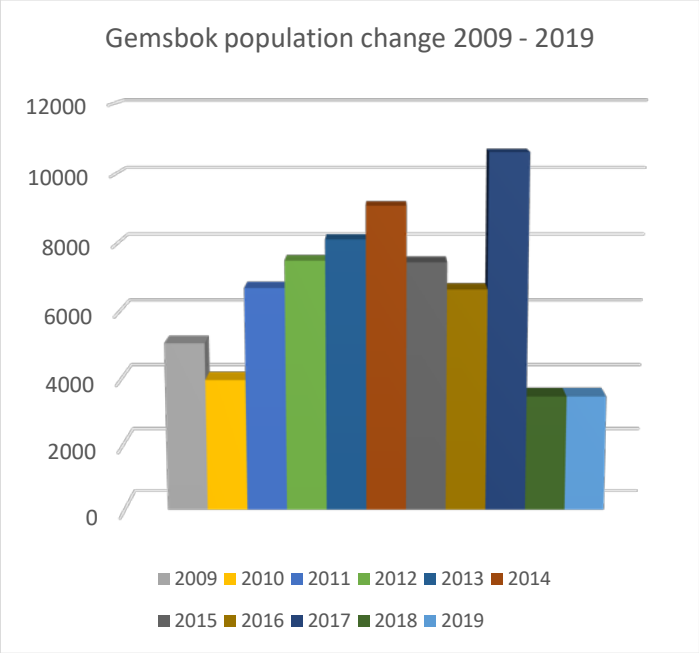


Figure 7.2

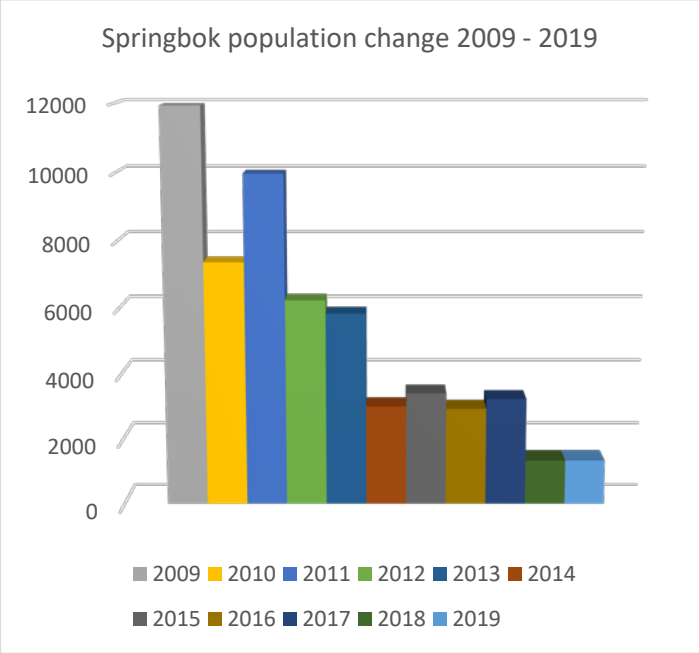


Figure 7.3

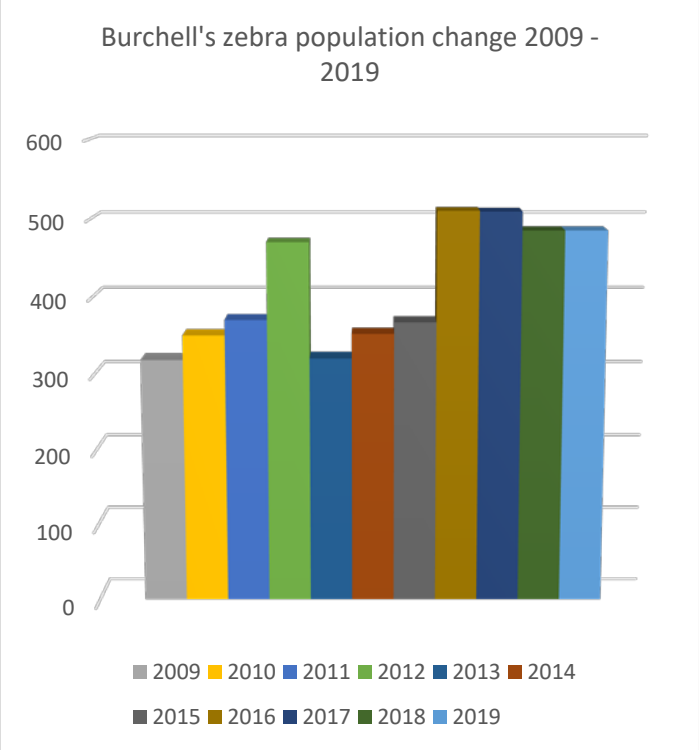
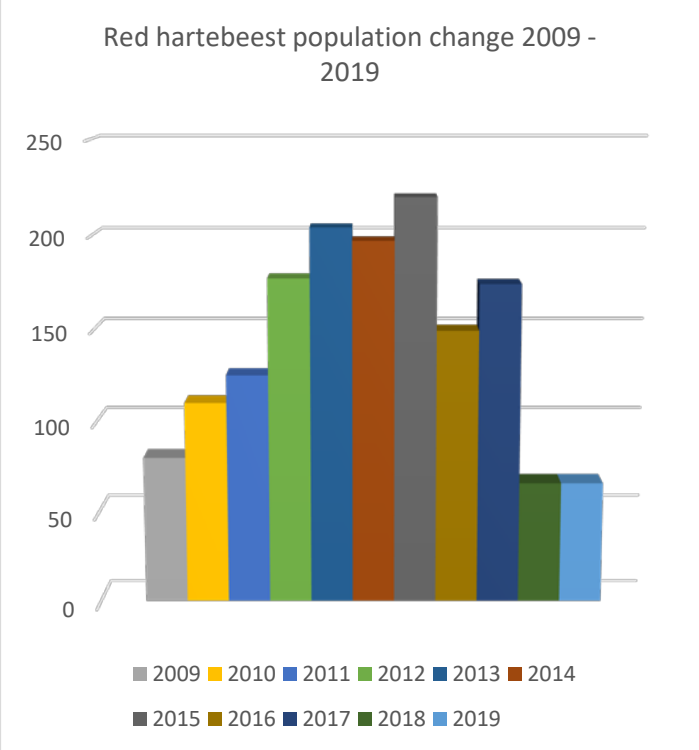
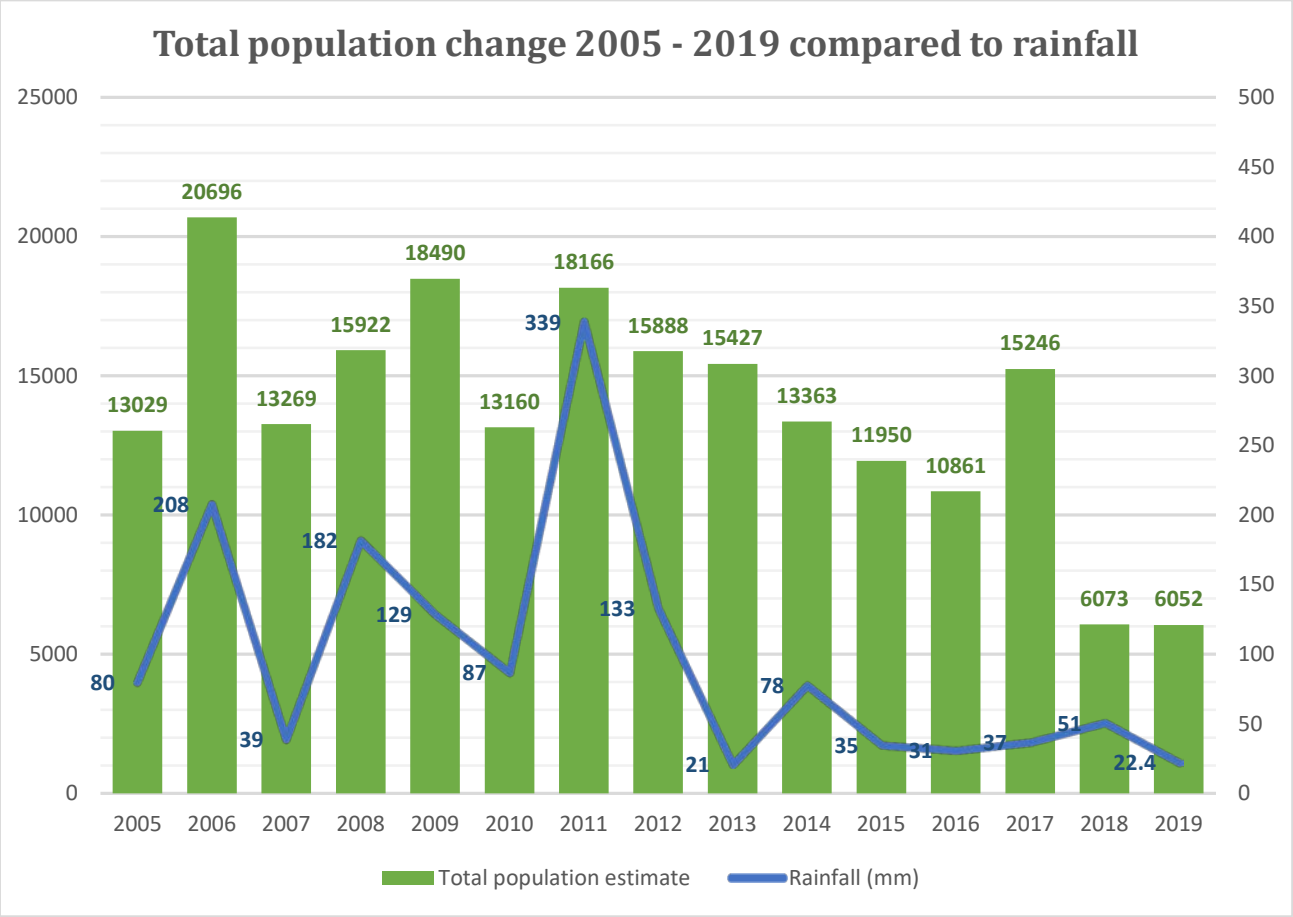


Figure 7.4



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 2019 compared to average rainfall.



5. Discussion and conclusions

Gemsbok
Interestingly while the number of actual gemsbok seen was slightly higher than the previous year, the estimated population was slightly lower. 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 2019 gemsbok population estimate show a decrease of 5.92% (3,480 gemsbok) from last year's estimate (3,699 gemsbok).

The highest density of gemsbok was recorded in Zone 5, which had a total of 524 gemsbok per 100 km. This is consistent with the previous year indicating a preference for the habitat found in this zone. The second highest density of gemsbok was in Zone 4 (391 gemsbok per 100 km). This distribution pattern is closer to the long term trend and shows a definite shift from the 2017 count where animals were concentrated in the plains in the northern parts of the Reserve.

Springbok
Similar to the population estimates of gemsbok, the actual number of Springbok seen was almost exactly the same as the previous year and yet the estimated population showed a marked decrease. This can be explained for the reasons listed above.

The estimated number of springbok for this year is 1,351, which is a decrease of 21.45% from last year's estimate of 1,720.

The springbok were predominantly concentrated in Zones 6, 10 and 2. This distribution pattern is almost the opposite of the gemsbok distribution and shows how the habitat selection of the two animals keeps them from direct competition for food.

Ostrich
This year's ostrich population estimate is 175. This is an 34.62% increase from last year's population estimate of 130. The majority of the sightings were in Zone 9 (29 ostrich) followed by zones 6 and 1 (9 and 8 ostrich respectively).

Burchell's Zebra
This year, a total of 307 zebra were counted to give a total estimated population of 485.

Red Hartebeest
The estimated number of red hartebeest increased from 149 in 2016 to 174 in 2017, a 16.78% increase. This population estimate however might be a bit low, because they were only seen in two zones. There was 61 hartebeest seen in Zone 2 and only 1 seen in Zone 5.

Giraffe
There were no giraffe sightings during this year's game count. Although there were no sightings there are regular sightings that suggest there are 9 giraffes on the reserve. There are 6 giraffes in the southern parts of the reserve, and 3 found in the northern parts of the reserve. It is unlikely that the population of giraffes will change in the near future, because the cows and bulls were separated during the relocation of a group of 4 to the southern part of 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:
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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
Gemsbok	61,3	69	113	180
Springbok	61,3	3	5	9
Kudu	61,3	0	0	0
Steenbok	61,3	0	0	0
Ostrich	61,3	8	13	12
Ludwig's Bustard	61,3	0	0	0
Ruppel's Korhaan	61,3	0	0	0
B. zebra	61,3	0	0	0
Hartebeest	61,3	0	0	0
Total	**61,3**	**80**	**131**	**201**
Jackal*		2		
H. Zebra*		19		

**Not included in count*

Table 12.2

Route 2				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	51	70	137	305
Springbok	51	61	120	365
Kudu	51	0	0	0
Steenbok	51	0	0	0
Ostrich	51	5	10	10
Ludwig's Bustard	51	8	16	52
Ruppel's Korhaan	51	2	4	19
B. zebra	51	0	0	0
Hartebeest	51	0	0	0
Total	**51**	**146**	**286**	**751**
Lappet Faced Vulture*		1		

**Not included in count*

Table 12.3

Route 3				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	50,3	58	115	329
Springbok	50,3	0	0	0
Kudu	50,3	0	0	0
Steenbok	50,3	0	0	0
Ostrich	50,3	3	6	12
Ludwig's Bustard	50,3	0	0	0
Ruppel's Korhaan	50,3	0	0	0
B. zebra	50,3	0	0	0
Hartebeest	50,3	0	0	0
Total	**50,3**	**61**	**121**	**341**

Table 12.4

Route 4				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	45	176	391	660
Springbok	45	5	11	24
Kudu	45	0	0	0
Steenbok	45	0	0	0
Ostrich	45	3	7	10
Ludwig's Bustard	45	10	22	112
Ruppel's Korhaan	45	4	9	66
B. zebra	45	6	13	14
Hartebeest	45	12	27	56
Total	**45**	**216**	**480**	**942**
Bat Eared Fox*		3		
Lappet Faced Vulture*		1		

**Not included in count*

Table 12.5

Route 5				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	69	362	525	850
Springbok	69	14	20	55
Kudu	69	0	0	0
Steenbok	69	0	0	0
Ostrich	69	0	0	0
Ludwig's Bustard	69	0	0	0
Ruppel's Korhaan	69	7	10	63
B. zebra	69	103	149	131
Hartebeest	69	4	6	10
Total	**69**	**490**	**710**	**1109**
Jackal*		1		
Lappet Faced Vulture*		4		

**Not included in count*

Table 12.6

Route 6				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	35	18	51	55
Springbok	35	58	166	278
Kudu	35	0	0	0
Steenbok	35	0	0	0
Ostrich	35	9	26	22
Ludwig's Bustard	35	0	0	0
Ruppel's Korhaan	35	0	0	0
B. zebra	35	0	0	0
Hartebeest	35	0	0	0
Total	**35**	**85**	**243**	**355**
Jackal*		4		
Bat Eared Fox*		3		
H. Zebra*		6		

**Not included in count*

Table 12.7

Route 7				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	55	86	156	289
Springbok	55	25	45	163
Kudu	55	0	0	0
Steenbok	55	0	0	0
Ostrich	55	5	9	13
Ludwig's Bustard	55	0	0	0
Ruppel's Korhaan	55	0	0	0
B. zebra	55	58	105	99
Hartebeest	55	0	0	0
Total	**55**	**174**	**316**	**564**
Giraffe*		1		

**Not included in count*

Table 12.8

Route 8				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	56	84	150	238
Springbok	50	25	50	103
Kudu	50	0	0	0
Steenbok	50	0	0	0
Ostrich	50	3	6	8
Ludwig's Bustard	50	1	2	8
Ruppel's Korhaan	50	6	12	73
B. zebra	50	140	280	241
Hartebeest	50	0	0	0
Total	**50**	**259**	**518**	**671**

Table 12.9

Route 9				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	52	79	152	401
Springbok	52	6	12	28
Kudu	52	0	0	0
Steenbok	52	0	0	0
Ostrich	52	29	56	88
Ludwig's Bustard	52	2	4	20
Ruppel's Korhaan	52	5	10	72
B. zebra	52	0	0	0
Hartebeest	52	0	0	0
Total	**52**	**121**	**233**	**609**

Table 12.10

Route 10				
Species	Route length	Total number counted	Density	Estimated population
Gemsbok	53	24	45	173
Springbok	53	70	132	326
Kudu	53	0	0	0
Steenbok	53	0	0	0
Ostrich	53	0	0	0
Ludwig's Bustard	53	0	0	0
Ruppel's Korhaan	53	0	0	0
B. zebra	53	0	0	0
Hartebeest	53	0	0	0
Total	**53**	**94**	**177**	**499**

Table 12.11

Total number of Game				
Species	Total Route length	Total number counted	Density	Estimated population
Gemsbok	527,6	1026	194	3480
Springbok	527,6	267	51	1351
Kudu	527,6	0	0	0
Steenbok	527,6	0	0	0
Ostrich	527,6	65	12	175
Ludwig's Bustard	527,6	21	4	192
Ruppel's Korhaan	527,6	24	5	293
B. zebra*	527,6	307	58	485
Hartebeest*	527,6	16	3	66
Total	**527,6**	**1726**	**327**	**6042**
Jackal**		7		
Bat Eared Fox**		6		
Giraffe**		1		
Lappet Faced Vulture**		6		
H. Zebra**		25		