NamibRand Nature Reserve

Annual Game Count

27 May 2024



Group of Burchell's Zebra found on route 8 of the Game count (Christa D'Alton)

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1. Introduction

This report analyses the data collected and summarizes the results from the annual game count held on the NamibRand Nature Reserve and the Pro-Namib Conservancy on 26 May 2024.

The day before the game count, participants were briefed on procedures. Jessica Steyn visited several concessionaires and met with participants to explain the count methodology and to divide them into different game count routes.

The long-term average rainfall for NamibRand is 70 mm per year. This year, an average of only 4.3 mm of rain was received across the Reserve, whereas last year the average rainfall received was 18.8 mm. The Family Hideout area had a total of 23.3 mm, which drew a lot of wildlife to the south. Drought conditions resulted in very poor or no grazing for wildlife on NamibRand. Significant rainfall was observed in the neighbouring Namib-Naukluft National Park to the west. As a result, many animals, such as oryx, moved into the Park in search of better pasture. This migration, in combination with the prevailing drought conditions on NamibRand, is the main cause of the 50% decrease in the wildlife population observed during this year's game count.

Animals counted per route range from 32 to 254 individual animals, including birds. The actual number of wildlife counted in May 2024 include 557 oryx and 119 springbok. In the previous year, the numbers counted were 1,439 oryx and 316 springbok. This year's results show that the estimated oryx population decreased by 65.94%, while springbok numbers decreased by 59.64%. The overall population estimate indicates that numbers have dropped by 49.03%.

It is worth reiterating that this census method best suits large plains game such as oryx, springbok and Burchell's zebra. The methodology is less suited for counting smaller species, such as steenbok, or species with different habitat requirements, such as kudu or mountain zebra. Carnivores for example, are best counted using camera traps and the mark and recapture population estimate method.

Population figures provided are intended to indicate population estimates on the Reserve. Wildlife management decisions are not based on population estimates, but rather on animal distribution (i.e. where the animals are and the trend (change) in animal numbers (i.e. are there more or fewer individuals). Distribution and trend are calculated based on the actual number of sightings and not on the population estimate.

While we are seeing less than half of the wildlife that we saw last year, this is not cause for concern. Yes, animals are suffering and the old and the weak may succumb to the drought. Most wildlife that is able to, has migrated off the NamibRand Nature Reserve in search of better grazing. We have spent many decades removing fences that impede migrating to create a large and open landscape that is necessary for a robust and healthy ecosystem. The desert is a boom and bust ecosystem and we are confident that wildlife numbers will recover once the drought has broken.

2. Summary

Data collected in the May 2024 game count was entered into our database and analysed.

The table below summarizes all animals counted, including animals seen at a distance farther than 500 m. This gives an idea of what was actually seen on the count.

Table 1. Total number of animals seen

Total of Species - 2024				
Mammals			**Birds**	
Oryx	557		Ostrich	37
Springbok	119		Ludwigs Bustard	23
Burchell's Zebra	273		Rüppell's Korhaan	67
Giraffe	3		Greater Kestrel	8
Mountain Zebra	15		Rock Kestrel	1
Warthog	1		Pale Chanting Goshawk	3
Ground squirrel	2		Crow (unknown)	8
Yellow Mongoose	2		Black Crow	5
			White-backed Vulture	
			Lappet-faced Vulture	8
Carnivores			Martial Eagle	1
Bat-eared Fox	49		Cape Turtle Dove	30
Jackal	11		Namaqua Sandgrouse	33
			Black korhaan	1

The table below shows the total number of animals counted per route.

Table 2. Total number of animals seen on each route

Total species counted per route - 2024	
1	**32**
2	**78**
3	**89**
4	**207**
5	**53**
6	**79**
7	**151**
8	**254**
9	**75**
10	**166**

The table below gives the total number of animals seen per route under 500 m. This is the amount used to calculate population estimates. (See Count Methodology on page 8)

Table 3. Total number of animals seen on each route, under a distance of less than 500m

Total species counted per route less than 500 m - 2024	
1	**32**
2	78
3	82
4	207
5	53
6	79
7	151
8	252
9	75
10	166

The results of the 2024 game count are as follows:

Objective 1: Population and Biomass Estimates:

Population estimates:

*Table 4. Total number of animals seen and the **estimated** population*

Total estimated numbers of game (Zone 1-10; May 2024)		
Species	**No. Counted**	**Estimate 2024**
Oryx	557	4799
Springbok	119	1731
Kudu	0	0
Steenbok	0	0
Zebra Burchell	273	4424
Hartebeest	0	0
Total	**949**	**10954**
Giraffe*	3	16
**** Total numbers known***		

Biomass estimates:

Table 5. Wildlife biomass estimates

Total wildlife numbers and wildlife biomass on NamibRand for May 2024 (Zone 1-10); 224 209 ha)				
Species	**Mean mass (kg)**	**Estimated wildlife numbers from May 2024 game count**	**Species biomass (kg)**	**Biomass per ha (kg)**
Oryx	220	4799	1055721	5.65
Springbok	38	1731	65781	0.35
B. Zebra	300	4424	1327222	7.11
Total	**558**	**10954**	**6112269**	**13.11**

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

Total no of animals counted per 100 km per route - 2024				
Route	**Route length (km)**	**Total number of animals**	**No of animals counted/100km**	**% of total animals counted per 100km**
1	55	32	58	3%
2	53	78	147	7%
3	53.7	82	153	7%
4	54	207	383	18%
5	70	53	76	3%
6	34.7	79	228	10%
7	61	151	248	11%
8	53.1	252	475	22%
9	53	75	142	6%
10	59	166	281	13%
Total	**546.5**	**1175**	**2190**	

Objective 3: Population change

Table 7. *The overall population estimate has decreased by -50.10%*

Total estimated numbers of game (Zone 1-10; May 2023 - May 2024)					
Species	**May-23**		**May-24**		**Percentage change**
	No. Counted	**Total estimated number**	**No. Counted**	**Total estimated number**	
Oryx	1439	14090	557	4799	-65.94%
Springbok	316	4289	119	1731	-59.64%
Kudu	0	0	0	0	0%
Steenbok	3	594	0	0	-100.00%
B. zebra	304	2967	273	4424	49.11%
Hartebeest	5	13	0	0	-100.00%
Total	**2067**	**21954**	**949**	**10954**	-50.10%
Giraffe*	15	15	16	16	6.67%
** Total numbers known*					

Note that the tendencies or changes in the population are calculated based on the actual number of animals seen. So, while the overall population estimate is just an estimate, the percentage change of the population cannot be disputed as it is based on the actual number of animals seen.

3. Count Methodology

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

Road Strip Count

Road strip count is one of the most effective methods 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 page 10.

The game count zones were divided into homogenous habitats as much as possible 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 1 km is used (500 m 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) from the vehicle/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 travelled) 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 (1000 m) divided by (ESW x 2) = species correction factor.

The area correction factor adjusts the number of animals seen, based on the percentage of the area sampled and assumes all animals within 500 m of the transect line are detected. For example: if two animals were seen in the 30% of the area covered, the missing 60% of the area (not covered) assumes that there should be another four animals that were not seen. This example would result in an area correction factor of three (3)

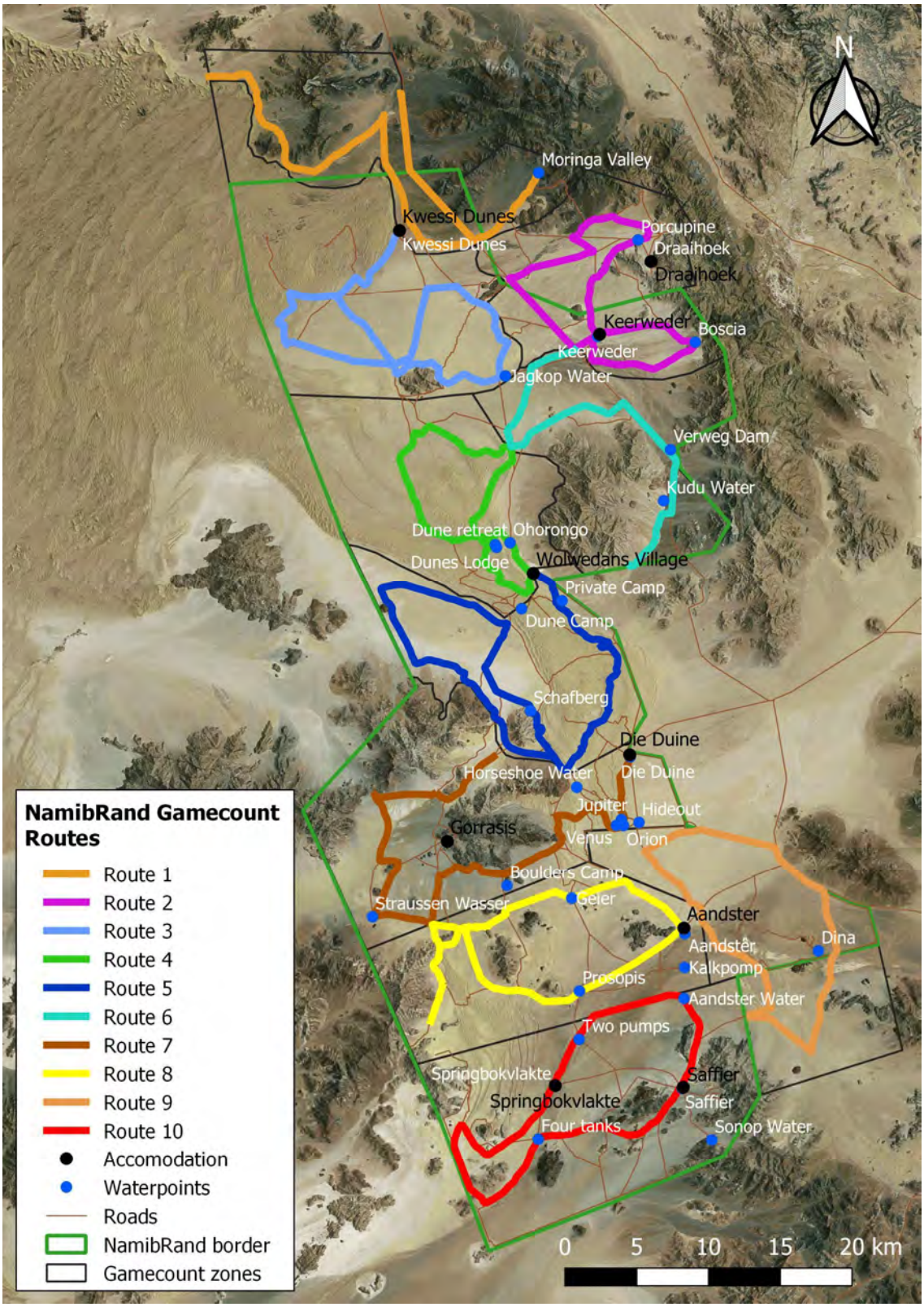
The species correction factor then adjusts this estimate based on the detection curve (ESW) for the species. In other words, the species correction factor compensates for the likelihood that the farther an animal is away from the car, the less likely it will be seen.

The correction factors and route distances as used in the 2024 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

Count areas, area correction factors, effective strip widths and species correction factor for 2024							
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	18072	12513	55	2.28	Oryx	137	3.66
					Springbok	253	1.97
2	18310	13779	53	2.60	Oryx	212	2.35
					Springbok	171	2.92
3	27039	26424	53.7	4.92	Oryx	128	3.91
					Burchell Zebra	80	6.25
4	21038	20996	54	3.89	Oryx	436	1.15
					Springbok	300	1.67
					Burchell Zebra	400	1.25
5	18038	17491	70	2.50	Oryx	320	1.56
					Burchell Zebra	60	2.00
6	19352	11589	34.7	3.34	Oryx	83	6.03
					Springbok	95	5.26
					Burchell Zebra	150	3.33
7	28343	18833	61	3.09	Oryx	243	2.06
					Springbok	200	2.50
					Burchell Zebra	110	4.55
8	22452	19291	53.1	3.63	Oryx	198	2.52
					Springbok	158	3.16
					Burchell Zebra	108	4.65
9	21710	21125	53	3.99	Oryx	96	5.19
					Springbok	65	7.69
					Burchell Zebra	60	8.33
10	29855	24721	59	4.19	Oryx	194	2.58
					Springbok	146	3.44
					Burchell Zebra	171	2.92
Total	**224209**	**186762**	**546.5**				

Figure 1. The game count area with the ten routes used.



Game Distribution Maps

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 the animal counted is seen is recorded. This grid number is then used to map the distribution of each recorded animal.

Figure 2. Example of the monad map with grid numbers



4. Objectives and Results – May 2024:

Objective 1: Population and Biomass Estimates

Population estimates:

The population estimate for individual species in the total count area is 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 calculate 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

Please note that where the total numbers of species with small populations are known (e.g. for introduced species such as giraffe), the known totals are used for the final population estimates in reference to the above calculated estimates.

The total estimates per species and per zone were then combined for all zones to determine the total population estimate for each plains game species in the count area (see Table 1 below).

Table 1. Total number of animals seen and the estimated numbers

Total estimated numbers of game (Zone 1-10; May 2024)		
Species	**No. Counted**	**Estimate 2024**
Oryx	557	4799
Springbok	119	1731
Kudu	0	0
Steenbok	0	0
Zebra Burchell	273	4424
Hartebeest	0	0
Total	**949**	**10954**
Giraffe*	3	16
**** 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 calculate the estimated biomass per species.

E: Estimated wildlife numbers
M: Mean mass per species
H: Total number 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-species competition. Please 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 system opposed to the open, unfenced system within the Reserve.

Table 6.1 and Figure 3 show the biomass estimates for this year, while tables 6.2 and 6.3 below show the comparison in biomass estimates for this year and previous years.

Table 6.1 Wildlife biomass estimates

Total wildlife numbers and wildlife biomass on NamibRand for May 2024 (Zone 1-10) ; 224 209 ha)				
Species	**Mean mass (kg)**	**Estimated wildlife numbers from May 2024 game count**	**Species biomass (kg)**	**Biomass per ha (kg)**
Oryx	220	4799	1055721	5.65
Springbok	38	1731	65781	0.35
B. Zebra	300	4424	1327222	7.11
Total	**558**	**10954**	**6112269**	**13.11**

The chart in Figure 3 below shows the biomass composition of the different species across the total count
area for the year 2024.

Figure 3. Biomass composition

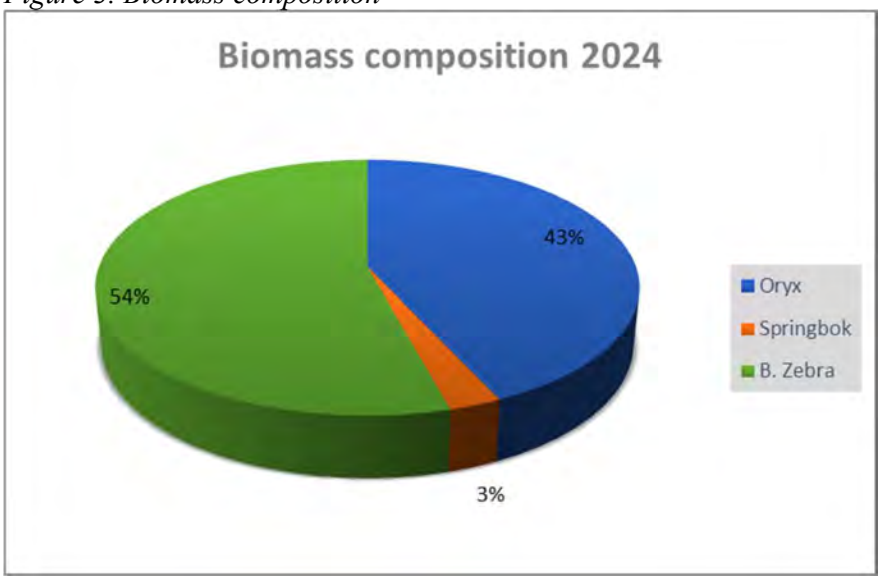


Table 6.2 Wildlife biomass (2023) percentage change compared to 2024

Wildlife biomass on NamibRand for May 23 and May 2024 (Zone 1-10) ; 224 209 ha)								
Wildlife species	**Mean mass (kg)**	**May-23**			**May-24**			
		Estimated wildlife numbers from May 2023 game count	**Species Biomass (kg)**	**Biomass per ha (kg)**	**Estimated wildlife numbers from May 2024 game count**	**Species Biomass (kg)**	**Biomass per ha (kg)**	**Biomass percentage change**
				TOTAL			**TOTAL**	
Oryx	220	14090	3099850	16.60	4799	1055721	5.65	**-65.94%**
Springbok	38	4289	163000	0.87	1731	65781	0.35	*-59.64%*
B. zebra	300	2967	890071	4.77	4424	1327222	7.11	*49.11%*
Total		**21347**	**4152921**	**22.24**	**10954**	**2448723.8**	**13.11**	*-41.04%*

Table 6.3 Wildlife biomass estimates from 2022-2024

Total wildlife biomass estimates (kg/ha) on NamibRand May 2022 to May 2024					
Wildlife species	**May-22**	**May-23**	**% change from May-22**	**May-24**	**% change from May 24**
Oryx	14.80	16.60	*12.14%*	5.65	*-65.94%*
Springbok	0.98	0.87	*-10.98%*	0.35	*-59.64%*
B. Zebra	4.04	4.77	*17.86%*	7.11	*49.11%*
Total	**19.82**	**22.24**	***12.17%***	**13.11**	***-41.04%***

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 (animals seen per 100 km driven)

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

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

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

Please note that the data is indicated on a gradient from light (low values) to dark (high values). The rain values were added to the maps to indicate where and how much rain was recorded; the bigger the circle, the more rain occurred there.

Figure 4.1 Total wildlife distribution

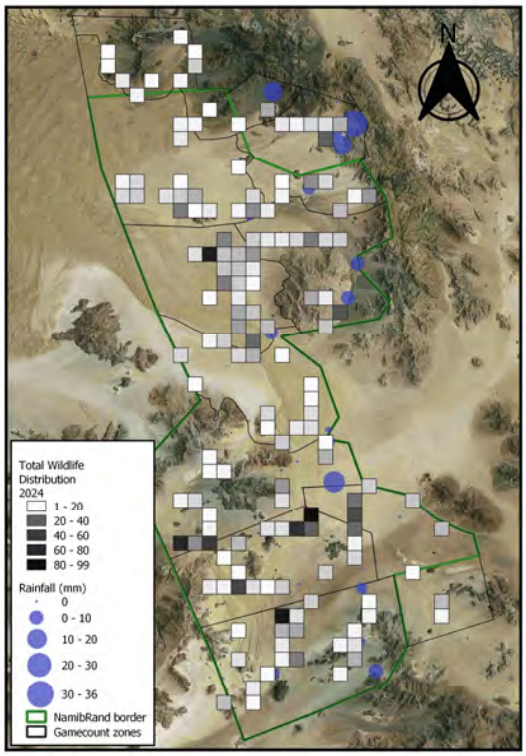


Figure 4.2 Total wildlife density

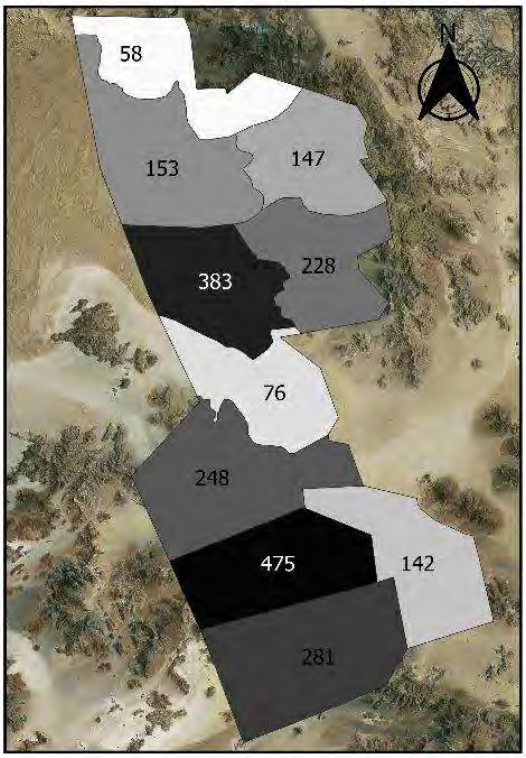


Figure 4.3 Distribution of oryx

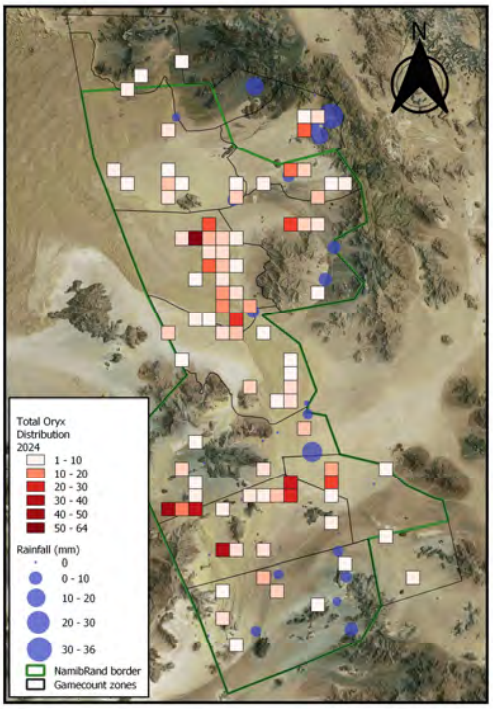


Figure 4.4 Density of oryx

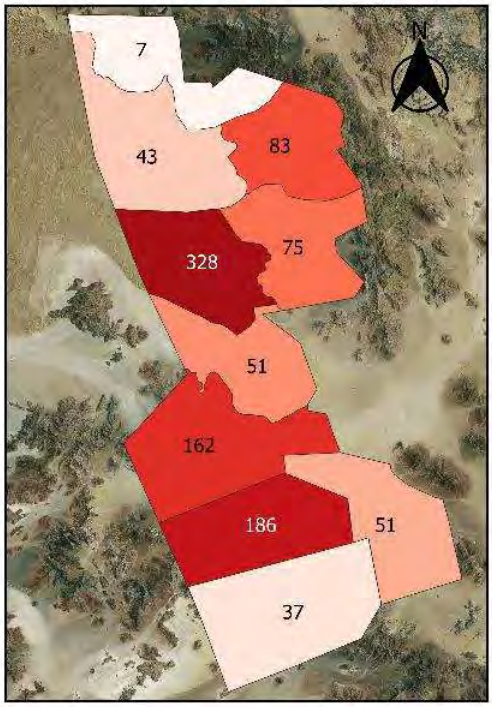


Figure 4.5 Distribution of springbok

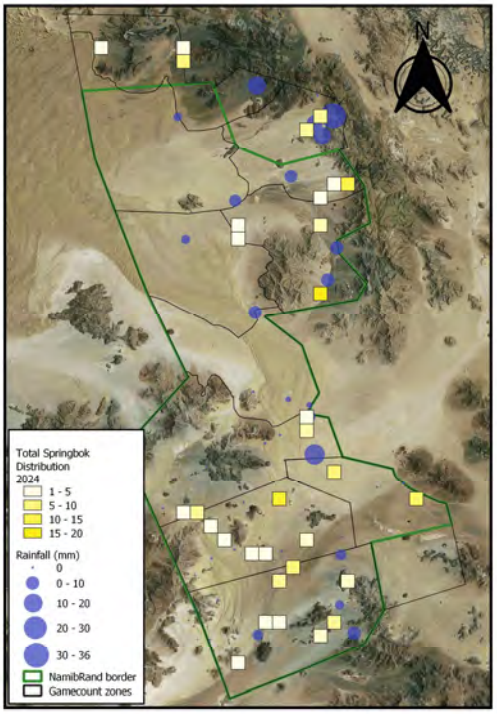


Figure 4.6 Density of springbok

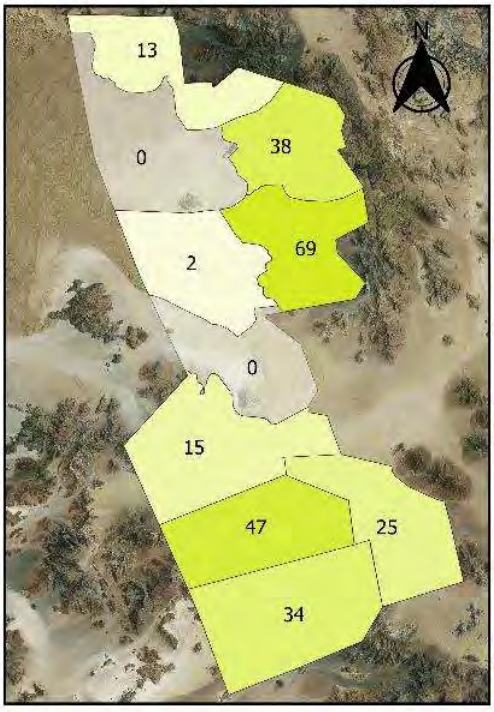


Figure 4.7 Distribution of Burchell's zebra

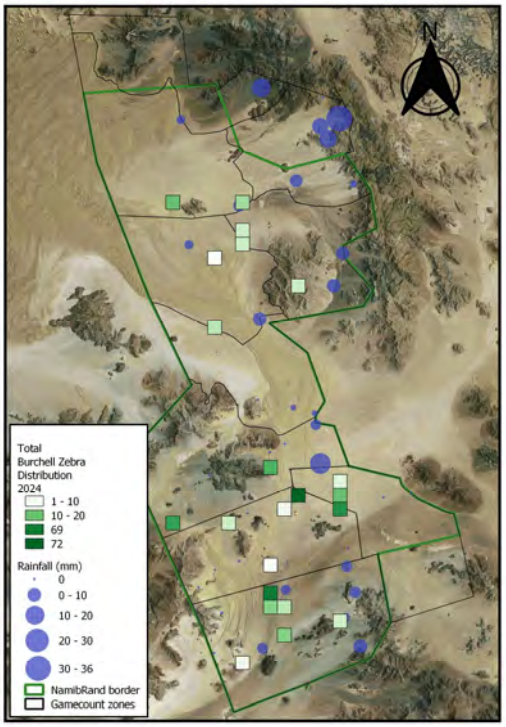
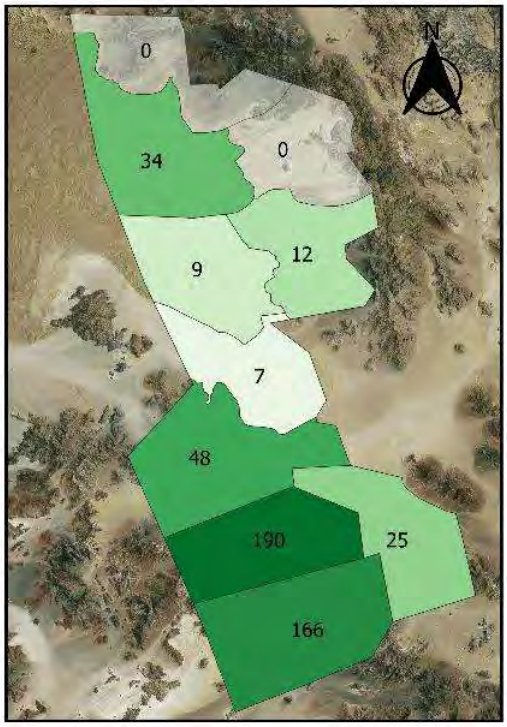


Figure 4.8 Density of Burchell's Zebra



The population densities (animals per 100 km driven) and actual number seen for oryx, springbok and Burchell's zebra per zone are shown in tables 7.1-7.3 below.

Table 7.1

Oryx			
Route	**Route length**	**Actual number seen**	**Density**
1	55	4	7.27
2	53	44	83.02
3	53.7	23	42.83
4	54	177	327.78
5	70	36	51.43
6	34.7	26	74.93
7	61	99	162.30
8	53.1	99	186.44
9	53	27	50.94
10	59	22	37.29
Total	**546.5**	**557**	**101.92**

Table 7.2

Springbok			
Route	**Route length**	**Actual number seen**	**Density**
1	55	7	12.73
2	53	20	37.74
3	53.7	0	0.00
4	54	1	1.85
5	70	0	0.00
6	34.7	24	69.16
7	61	9	14.75
8	53.1	25	47.08
9	53	13	24.53
10	59	20	33.90
Total	**546.5**	**119**	**21.77**

Table 7.3

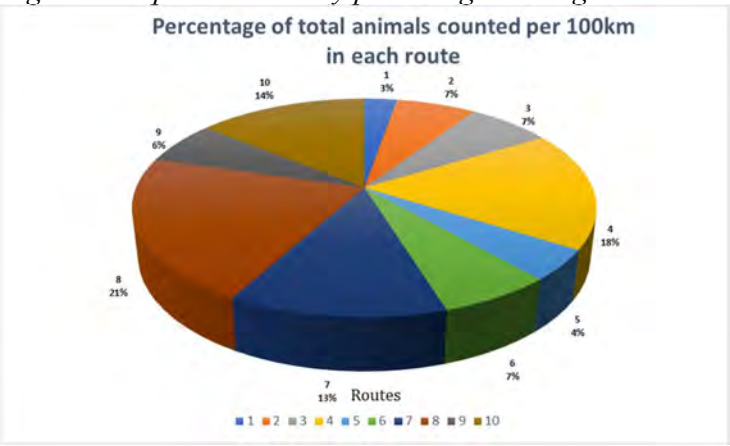
Burchell's zebra			
Route	**Route length**	**Actual number seen**	**Density**
1	55	0	0.00
2	53	0	0.00
3	53.7	18	33.52
4	54	5	9.26
5	70	5	7.14
6	34.7	4	11.53
7	61	29	47.54
8	53.1	101	190.21
9	53	13	24.53
10	59	98	166.10
Total	**546.5**	**273**	**49.95**

Table 8 below shows the total wildlife density for all game species combined in each count zone, and Figure 5 shows the percentage distribution in each zone.

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

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	55	32	3%
2	53	78	7%
3	53.7	82	7%
4	54	207	18%
5	70	53	5%
6	34.7	79	7%
7	61	151	13%
8	53.1	252	21%
9	53	75	6%
10	59	166	14%
Total	**546.5**	**1175**	

Figure 5. Population density percentages throughout the count area.



The total wildlife numbers for all species combined per count zone in 2024, compared to 2023 and 2022, is shown in Table 9 below.

Table 9. Total number of animals counted per 100 km for each route compared to 2019 to 2024.

Total no of animals counted per 100 km per route (May 2019 - May 2024)							
Route	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**% change (Jun-04 to May-24)**
1	131	15	275	513	234	32	-86.32%
2	286	142	212	240	445	78	-82.47%
3	121	354	130	204	329	82	-75.08%
4	480	8	533	273	661	207	-68.68%
5	710	35	244	196	282	53	-81.21%
6	243	182	83	356	122	79	-35.25%
7	316	320	360	120	191	151	-20.94%
8	518	75	340	39	114	252	121.05%
9	233	269	64	155	62	75	20.97%
10	177	25	129	248	155	166	7.10%
Total	**3215**	**1425**	**2370**	**2344**	**2595**	**1175**	**-54.72%**
Average	**321.5**	**142.5**	**237**	**234.4**	**259.5**	**117.5**	

Figure 6.1 Total wildlife population changes from 2004-2024.

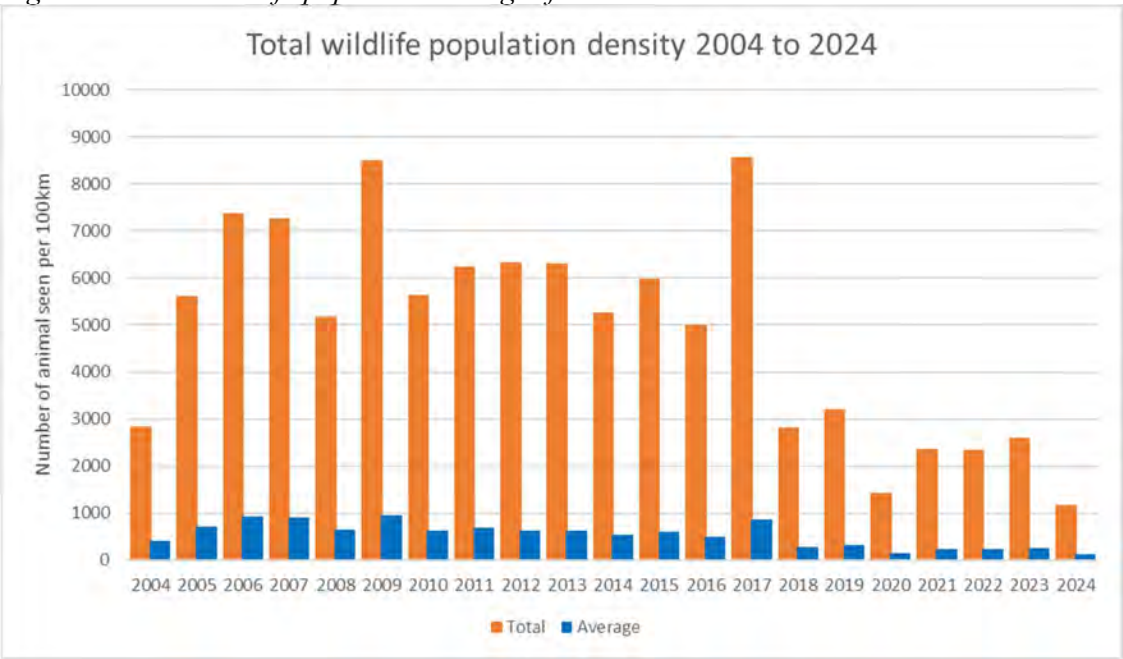
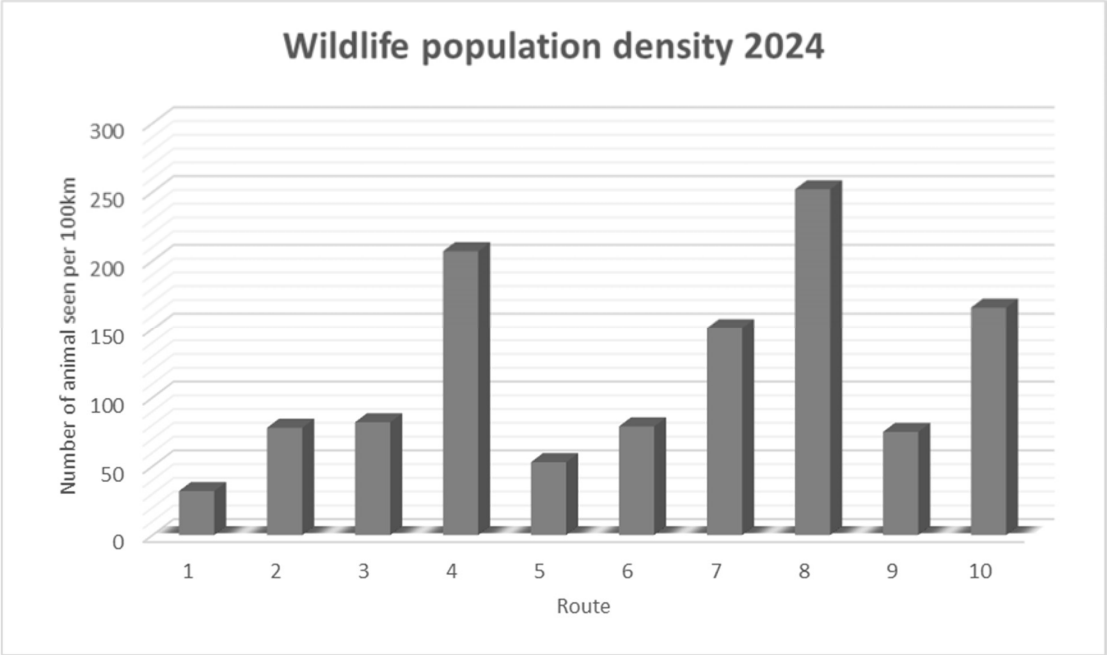


Figure 7.2 Wildlife density per route for 2024.



Objective 3: Population Change

The total estimated numbers of animals for the 2024 count are 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 decreased by 50.10%.

Table 10. Population estimates from 2023 compared to 2024

Total estimated numbers of game (Zone 1-10; May 2023 - May 2024)					
Species	**May-23**		**May-24**		**Percentage change**
	No. Counted	**Total estimated number**	**No. Counted**	**Total estimated number**	
Oryx	1439	14090	557	4799	-65.94%
Springbok	316	4289	119	1731	-59.64%
Kudu	0	0	0	0	0%
Steenbok	3	594	0	0	-100.00%
B. zebra	304	2967	273	4424	49.11%
Hartebeest	5	13	0	0	-100.00%
Total	**2067**	**21954**	**949**	**10954**	-50.10%
Giraffe*	15	15	16	16	6.67%
** Total numbers known*					

The long-term total population estimates for Oryx, springbok and Burchell's zebra are presented in Figure 7.1 below for all zones. It shows the long term actual population and total population estimate change compared to the average annual rainfall received for the same period. Please note that as with the previous graphs, the data for this graph was taken from the total population estimates and from the maximum number of routes counted in each year.

Figure 7.1 Total population change from 2005 to 2024 compared to average rainfall for Oryx, springbok and Burchell's zebra population

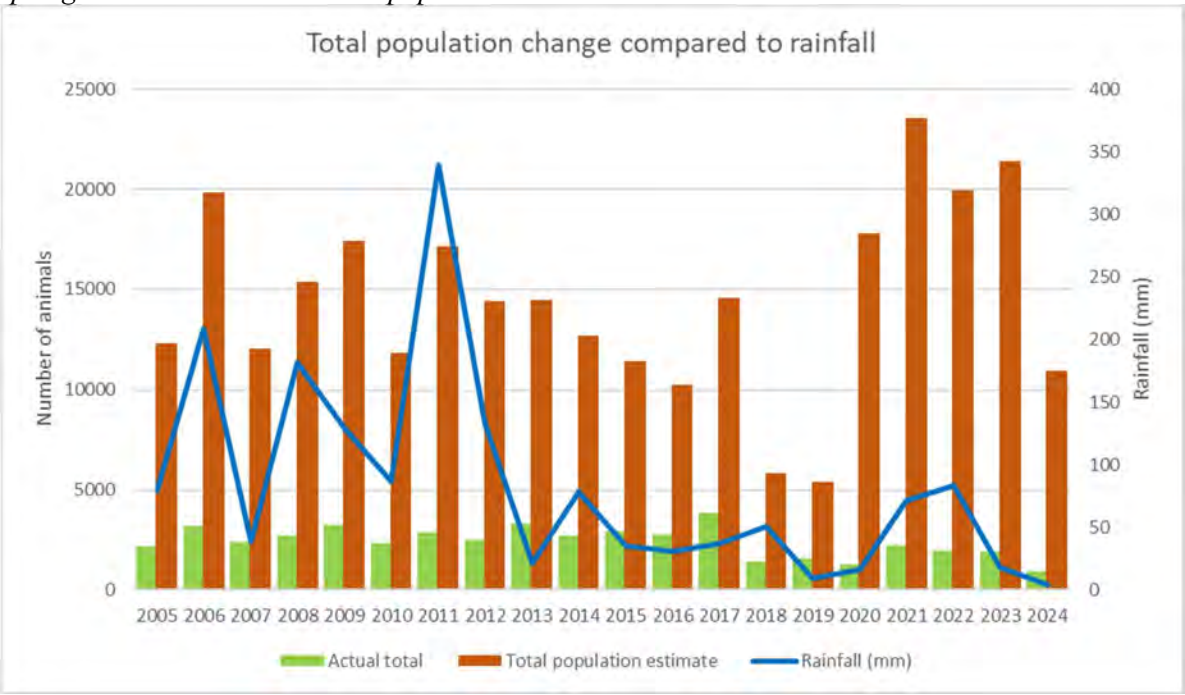


Figure 7.2 Oryx population change

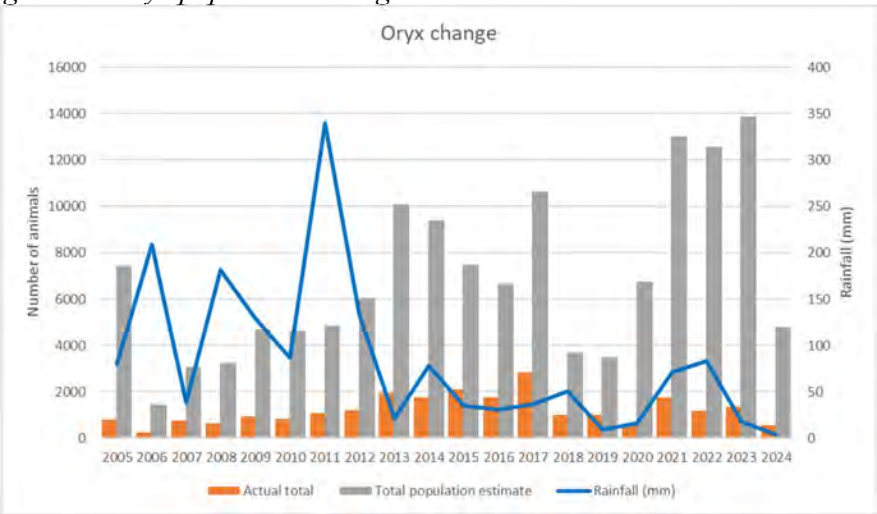


Figure 7.3 Springbok population change

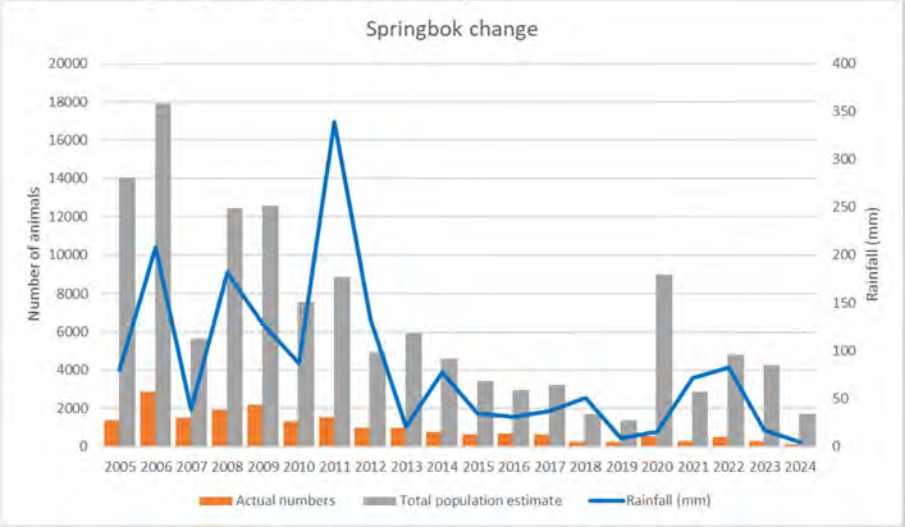
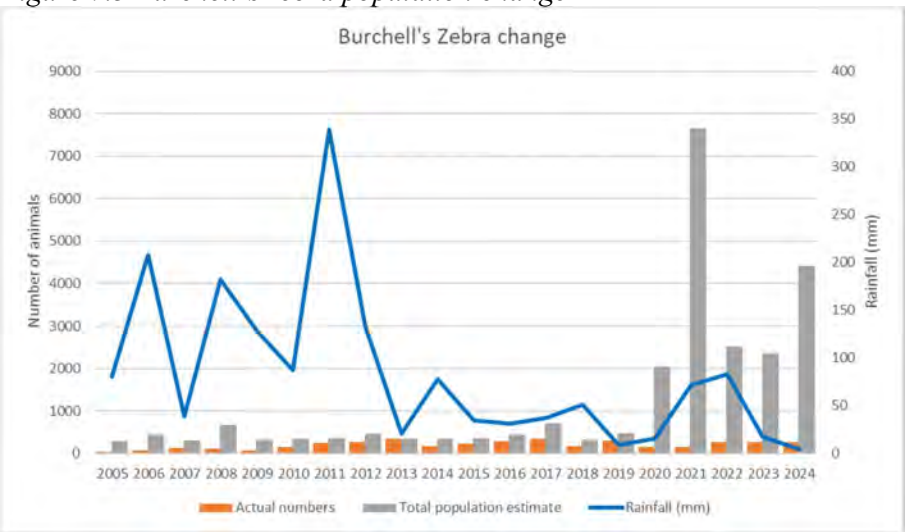


Figure 7.3 Burchell's zebra population change



5. Discussion and Conclusions

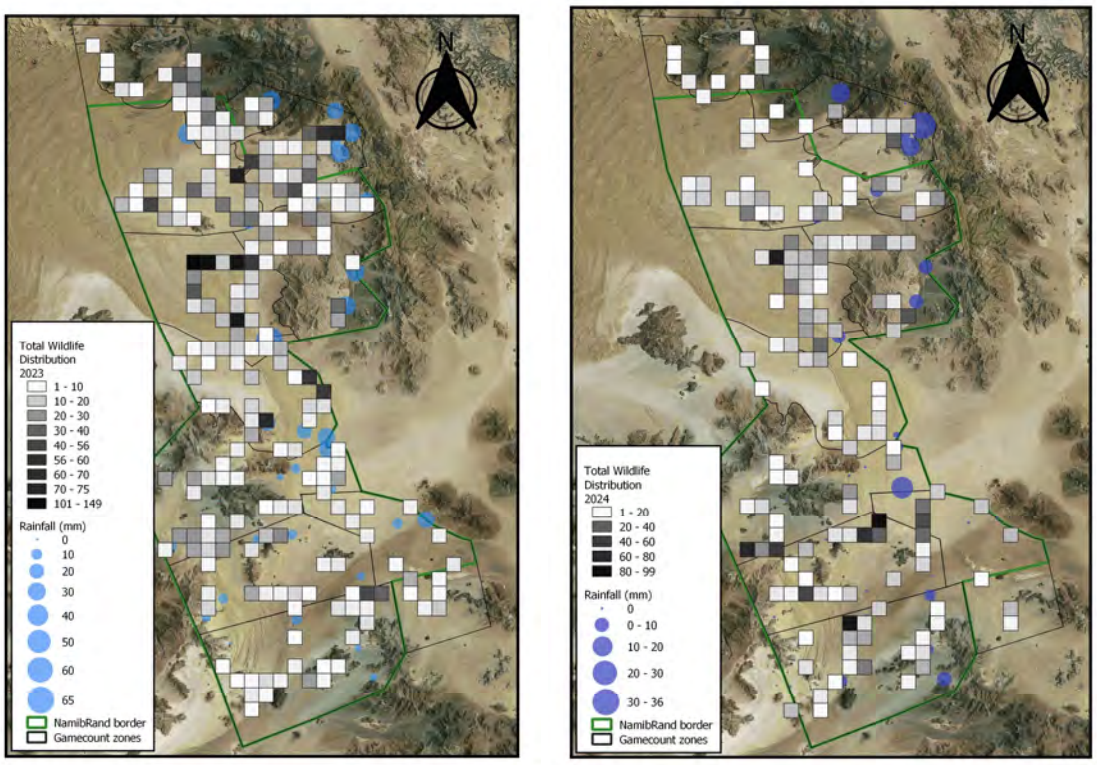
Total population change, distribution and densities

The total population estimate decreased by 50.10%. The total wildlife population estimate this year is 10954, compared to 21954 last year. The highest concentration of animals was found in the southern part of the Reserve.

For resource management purposes, we use the actual number of animals seen instead of the estimates. This gives a better reflection of where and how many animals there are. Long-term data shows that the total estimated wildlife population has been on the increase since 2019. However, this year it decreased due to low rainfall and grazing availability. This trend is directly proportional to the annual average rainfall received in the total count area over the given years, as shown in Figure 7.1 on page 21.

The total wildlife distribution for 2023 and 2024 is shown in Figure 8.1. There is a correlation between the wildlife distribution and the rainfall received this year. It can be seen that wildlife moved from the north to the south.

Figure 8.1 Wildlife distribution



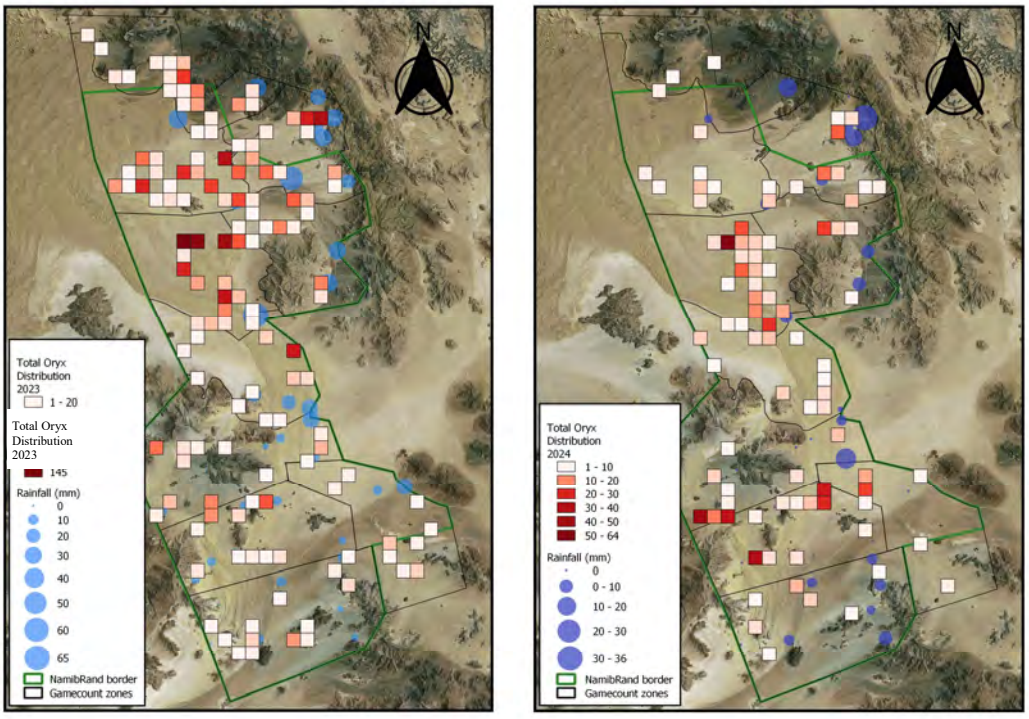
Oryx

The 2024 oryx population estimate shows an decrease of 65.94%. This year's estimate is 4799, down from last year's estimate of 14090.

The highest density of oryx was recorded in Zone 4, with 177 individual oryx counted. The highest concentration of oryx was seen in the northern part of the Reserve in the dune areas, as seen in Figure 8.2 on the right. This is because the dunes hold moisture for longer, and grass provides a bit more food availability for them.

The stronger, healthier Oryx all moved to the National Park or other areas that received more rain. The Oryx that remained on NamibRand where the ones who are either too young to migrate large distances or old ones that can't migrate as well.

Figure 8.2 Oryx distribution

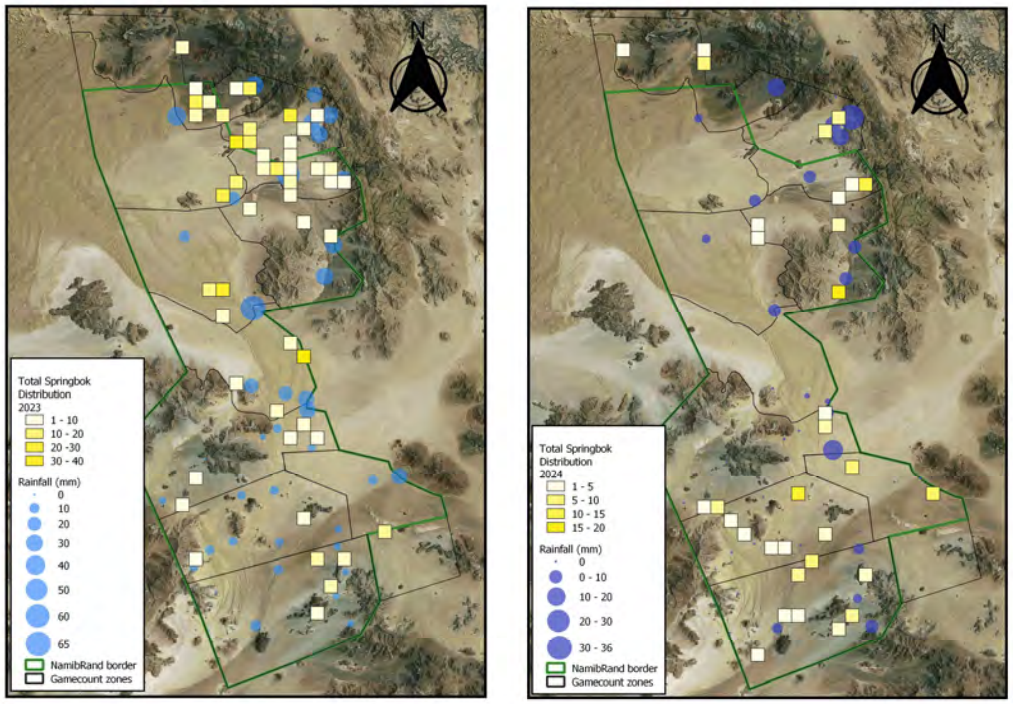


Springbok

The estimated number of springbok for this year is 1731, which is a decrease of 59.64% from last year's estimate of 4289.

Like the oryx, the springbok were predominantly seen in the southern part of the Reserve, as seen in Figure 8.3. Lower numbers were seen in the central and northern parts of the Reserve.

Figure 8.3 Springbok distribution

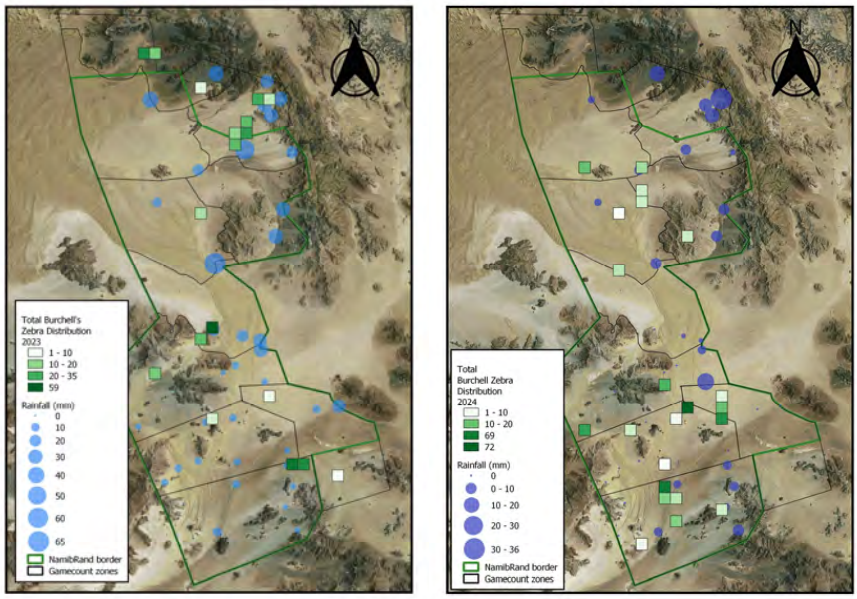


Burchell's Zebra

This year 273 Burchell's zebra were counted to give a total estimated population of 4424, compared to last year's estimate of 2967.

The Burchell's zebra population is well distributed throughout the Reserve, but has now mainly moved to the South with only small numbers remaining in the North. Unlike migratory species like oryx and springbok, the effects of a drought are delayed on the impact of the overall population of Burchell's zebra. These animals make use of old and sometime moribund grasses that are no longer palatable to other grazers. As a result, this population continues to grow and the overall Burchell's zebra population estimate increased by 49.11%.

Figure 8.3 Burchell's zebra distribution



6. Acknowledgments

The NamibRand Nature Reserve would like to thank all its concessionaires, stakeholders, neighbours and participants for their enthusiastic involvement in making this year's game count a success.

This year's participants were:
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7. Appendix

Results per count route per zone

Tables 11.1 to 11.11 list the data collected on each route in May 2024, which were used as a basis for the analysis.

Table 11.1

Route 1				
Species	Route length	Total number counted	Density	Estimated population
Oryx	55	4	7	33
Springbok	55	7	13	31
Ostrich	55	5	9	24
Ludwigs Bustard	55	1	2	10
Ruppells korhaan	55	7	13	54
Mountain Zebra	55	8	15	36
Total	**55**	**32**	**58**	**188**

Table 11.2

Route 2				
Species	Route length	Total number counted	Density	Estimated population
Oryx	53	44	83	269
Springbok	53	20	38	152
Ludwigs Bustard	53	1	2	11
Ruppells korhaan	53	11	21	96
Jackal	53	1	2	
Pale Chanting Goshawk	53	1	2	130
Lappet-faced Vulture	53	2	4	130
Black korhaan	53	1	2	26
Total	**53**	**78**	**147**	**814**

Table 12.3

Route 3				
Species	Route length	Total number counted	Density	Estimated population
Oryx	53.7	23	43	350
Ostrich	53.7	9	17	93
Ludwigs Bustard	53.7	4	7	86
Ruppells korhaan	53.7	4	7	66
Zebra Burchell	53.7	18	34	437
Bat-eared Fox	53.7	11	20	221
Jackal	53.7	2	4	
Greater Kestrel	53.7	8	15	114
Rock Kestrel	53.7	1	2	97
Pale Chanting Goshawk	53.7	1	2	39
Black Crow	53.7	1	2	97
Martial Eagle	53.7	1	2	65
Total	**53.7**	**82**	**153**	**1666**

Table 11.4

Route 4				
Species	Route length	Total number counted	Density	Estimated population
Oryx	54	177	328	790
Springbok	54	1	2	6
Ludwigs Bustard	54	13	24	220
Ruppells korhaan	54	3	6	39
Zebra Burchell	54	5	9	24
Ground squirrel	54	1	2	39
Jackal	54	2	4	16
Pale Chanting Goshawk	54	1	2	10
Black Crow	54	4	7	39
Lappet-faced Vulture	54	2	4	19
Namaqua sandgrouse	54	33	61	1283
Total	**54**	**207**	**383**	**2485**

Table 11.5

Route 5				
Species	Route length	Total number counted	Density	Estimated population
Oryx	70	36	51	219
Ruppells korhaan	70	8	11	67
Zebra Burchell	70	5	7	39
Bat-eared Fox	70	4	6	26
Lappet-faced Vulture	70	1	1	4
Total	**70**	**53**	**76**	**355**

Table 11.6

Route 6				
Species	Route length	Total number counted	Density	Estimated population
Oryx	34.7	26	75	610
Springbok	34.7	24	69	491
Ludwigs Bustard	34.7	4	12	58
Ruppells korhaan	34.7	10	29	112
Zebra Burchell	34.7	4	12	52
Mountain Zebra	34.7	7	20	76
Jackal	34.7	4	12	156
Total	**34.7**	**79**	**228**	**1554**

Table 11.7

Route 7				
Species	Route length	Total number counted	Density	Estimated population
Oryx	61	99	162	791
Springbok	61	9	15	87
Ostrich	61	1	2	6
Ruppells korhaan	61	4	7	41
Zebra Burchell	61	29	48	513
Bat-eared Fox	61	9	15	78
Total	**61**	**151**	**248**	**1517**

Table 11.8

Route 8				
Species	Route length	Total number counted	Density	Estimated population
Oryx	53.1	99	186	970
Springbok	53.1	25	47	307
Ostrich	53.1	9	17	69
Ruppells korhaan	53.1	12	23	146
Zebra Burchell	53.1	101	190	1827
Giraffe	53.1	1	2	16
Ground squirrel	53.1	1	2	194
Yellow mongoose	53.1	2	4	389
Jackal	53.1	2	4	11
Lappet-faced Vulture	53.1	2	4	8
Cape Turtle Dove	53.1	30	56	5832
Total	**53.1**	**252**	**475**	**9771**

Table 11.9

Route 9				
Species	Route length	Total number counted	Density	Estimated population
Oryx	53	27	51	545
Springbok	53	13	25	389
Ostrich	53	5	9	42
Zebra Burchell	53	13	25	421
Giraffe	53	2	4	16
Bat-eared Fox	53	15	28	292
Total	**53**	**75**	**142**	**1728**

Table 11.10

Route 10				
Species	Route length	Total number counted	Density	Estimated population
Oryx	59	22	37	221
Springbok	59	20	34	267
Ostrich	59	7	12	62
Ruppells korhaan	59	8	14	113
Zebra Burchell	59	98	166	1111
Warthog	59	1	2	10
Bat-eared Fox	59	10	17	216
Lappet-faced Vulture	59	1	2	19
Total	**59**	**166**	**281**	**2019**

Table 11.11

Total number of wildlife				
Species	Route length	Total number counted	Density	Estimated population
Oryx	546.5	557	101.92	4799
Springbok	546.5	119	21.77	1731
Ostrich	546.5	36	6.59	295
Ludwigs Bustard	546.5	23	4.21	385
Ruppells korhaan	546.5	67	12.26	735
Zebra Burchell	546.5	273	49.95	4424
Giraffe	546.5	3	0.55	16
Mountain Zebra	546.5	15	2.74	112
Warthog	546.5	1	0.18	10
Ground squirrel	546.5	2	0.37	233
Yellow mongoose	546.5	2	0.37	389
Bat-eared Fox	546.5	49	8.97	833

Jackal	546.5	11	2.01	182
Greater Kestrel	546.5	8	1.46	114
Rock Kestrel	546.5	1	0.18	97
Pale Chanting Goshawk	546.5	3	0.55	179
Black Crow	546.5	5	0.91	136
Lappet-faced Vulture	546.5	8	1.46	181
Martial Eagle	546.5	1	0.18	65
Rock Pigeon	546.5	0	0.00	0
Cape Turtle Dove	546.5	30	5.49	5832
Namaqua sandgrouse	546.5	33	6.04	1283
Black korhaan	546.5	1	0.18	26
Total	**546.5**	**1175**	**215.00**	**22098**