Results
of the
NamibRand Nature Reserve
Bi-annual Game Count

4 – 5 November 2005

By: Nils Odendaal – Control Warden
&
Danica Shaw – Environment and Research Warden

NamibRand Nature Reserve
PO Box 131 Maltahöhe, Namibia
Tel / Fax: +264-63-683026
Email: nrnr@iway.na
Web: www.namibrand.com

Table of Contents

Summary

This paper provides feedback and results of the bi-annual game count as held on the NamibRand Nature Reserve on 4 and 5 November 2005.

This "end of dry season" vehicle-based game count was conducted as an in-house event, with assistance provided by those willing and able to do so. No extensive training or feedback events were held, as these are reserved for the public participatory game count, usually held at the "end of wet season" count in June / July of each year. However, some training on count techniques and methodology was presented to new counters by Senior Ranger, Andreas Keding, at the Die Duine homestead on the afternoon of 4 November 2005.

The count of Route 1 was conducted on the morning of 4 November 2005, while all other routes (Route 2 - 8) were counted on the morning of 5 November 2005.

Results of this game count are very encouraging. With reference to the Reserve's three objectives an executive summary of data can be describe as follows:

Objective 1: Population Estimates
The overall population estimate has risen by 20%

Objective 2: Wildlife Distribution
Game densities in the eastern and most southern areas of the Reserve have increased exponentially, while densities in the west are significantly lower than in June 2005.

Objective 3: Population Change
A significant increase for each species of wildlife has been recorded. Although populations are lower in the western areas of the Reserve, populations have increased massively in the eastern and southern part of the Reserve. Interesting to note is the overall increase in the frequency of wildlife sightings. Animals seen per hundred kilometers driven are up 37%.

The results can be attributed to the above average 2004 / 2005 rainy season and the west to east seasonal migration of plains game in the pro-Namib region.

Methodology

This paper will not provide a detailed description of the count methodology used. For more information on this please refer to the results paper from 3 – 4 June 2005 (Odendaal & Shaw).

For the benefit of the novice reader and as a refresher the core philosophy of the methodology used will be summarized.

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

1) Distance
The distance to each animal or group of animals counted is recorded at right angles to the vehicle. This distance allows us to apply a "species" correction factor for each type of animal counted. This done in order to compensate for animals not seen.

For example, the chances of seeing large animals such as zebra over a far distance are much higher than the probability or chances of seeing a smaller animals such as steenbok. Therefore, a correction factor of 2 can be used for zebra (because you are likely to see most of them over a set distance). A much higher correction factor of 10 can be used for steenbok – over the same set distance you are likely only to see a few steenbok while the rest will be hidden by dead ground or obstacles.

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

Table 1 lists the area and species correction factors used on the NamibRand Nature Reserve.

Bearing the Reserve's objectives for counting in mind results are thus calculated as follows:

Objective 1: Population estimates (P)

Actual number of animals seen (S)
Area correction factor (A)
Species correction factor (B)

Formula for calculating population estimates

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

Objective 2: Wildlife distribution

Data from actual sightings, not the estimates, is calculated for all routes to animals seen per 100km. This is done so as to standardize the results to a value which is uniform for all routes. These calculations enable us to obtain accurate density and distribution figures.

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

Formula for calculating animals seen per 100 km driven

(S ÷ R) x 100 = K

Objective 3: Population change

To calculate the change in population only actual sightings are used, not the estimates. As with distribution above, standardized data needs to be used so that comparisons can be made. The data from each route is compared to previous data and the percentage change for each route and for the Reserve as a whole can be calculated. The percentage change for the total of each species can also be calculated in the same way.

Previous Value (P)
Current Value (C)
Percentage Change (R)

Formula for calculating percentage change

((C - P) ÷ P) x 100 = R

Table 1:

Correction Factors

Route	Area Correction Factor
1	2.89
2	3.04
3	3.7
4	3.74
5	2.30
6	5.01
7	4.91
8	3.74

Species	Species' Correction Factor
Gemsbok	2.4
Springbok	2.9
Kudu	2.6
Steenbok	10.0
Burchells Zebra	2.0
Ostrich	2.1

Results

Route Results

Tables 2 - 9 list the data collected on each route which was then analyzed. Numbers seen within the strip width (under 500m) have been multiplied by the relevant correction factor for each route. See Table 1 for the relevant correction factor for each route.

Table 2:

Route 1			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	85	55	159
Springbok	177	139	401
Kudu	3	1	3
Steenbok			
Burchells Zebra	10		
Ostrich	4	1	3
Blesbok			
Red Hartebeest			
Total	**279**	**196**	**566**

Table 3:

Route 2			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	135	116	352
Springbok	539	448	1,360
Kudu			
Steenbok			
Burchells Zebra	59	11	33
Ostrich	24	20	61
Blesbok			
Red Hartebeest	3	2	50*
Total	**760**	**597**	**1,856**

* numbers of these species are known

Table 4:

Route 3			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	95	91	337
Springbok	43	43	159
Kudu			
Steenbok			
Burchells Zebra	11	11	41
Ostrich	12	11	41
Blesbok			
Red Hartebeest			
Total	**161**	**156**	**577**

Table 5:

Route 4			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	88	88	329
Springbok	22	22	82
Kudu			
Steenbok			
Burchells Zebra			
Ostrich	9	9	34
Blesbok			
Red Hartebeest			
Total	**119**	**119**	**445**

Table 6:

Route 5			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	113	113	260
Springbok	164	164	378
Kudu			
Steenbok			
Burchells Zebra			
Ostrich	14	14	32
Blesbok			
Red Hartebeest			
Total	**291**	**291**	**670**

Table 7:

Route 6			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	73	36	180
Springbok	280	275	1,377
Kudu	66	63	315
Steenbok	2	2	10
Burchells Zebra	37	37	185
Ostrich	33	19	95
Blesbok	1	1	5
Red Hartebeest	38	2	50*
Total	**530**	**435**	**2,218**

* numbers of these species are known

Table 8:

Route 7			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	173	135	663
Springbok	129	124	609
Kudu			
Steenbok			
Burchells Zebra			
Ostrich	6	3	15
Blesbok			
Red Hartebeest			
Total	**308**	**262**	**1,286**

Table 9:

Route 8			
Species	**Numbers seen - Total**	**Number seen under 500m**	**No. Corrected for area - Nov 2005**
Gemsbok	665	348	1,708
Springbok	343	283	1,389
Kudu			
Steenbok			
Burchells Zebra			
Ostrich	41	25	123
Blesbok			
Red Hartebeest			
Total	**1049**	**656**	**3,220**

Population Estimate

Table 10 presents the total population estimate for plains game on the NamibRand Nature Reserve. Final figures have been determined by multiplying all sightings under 500m by both the area and species correction factors.

Table 10:

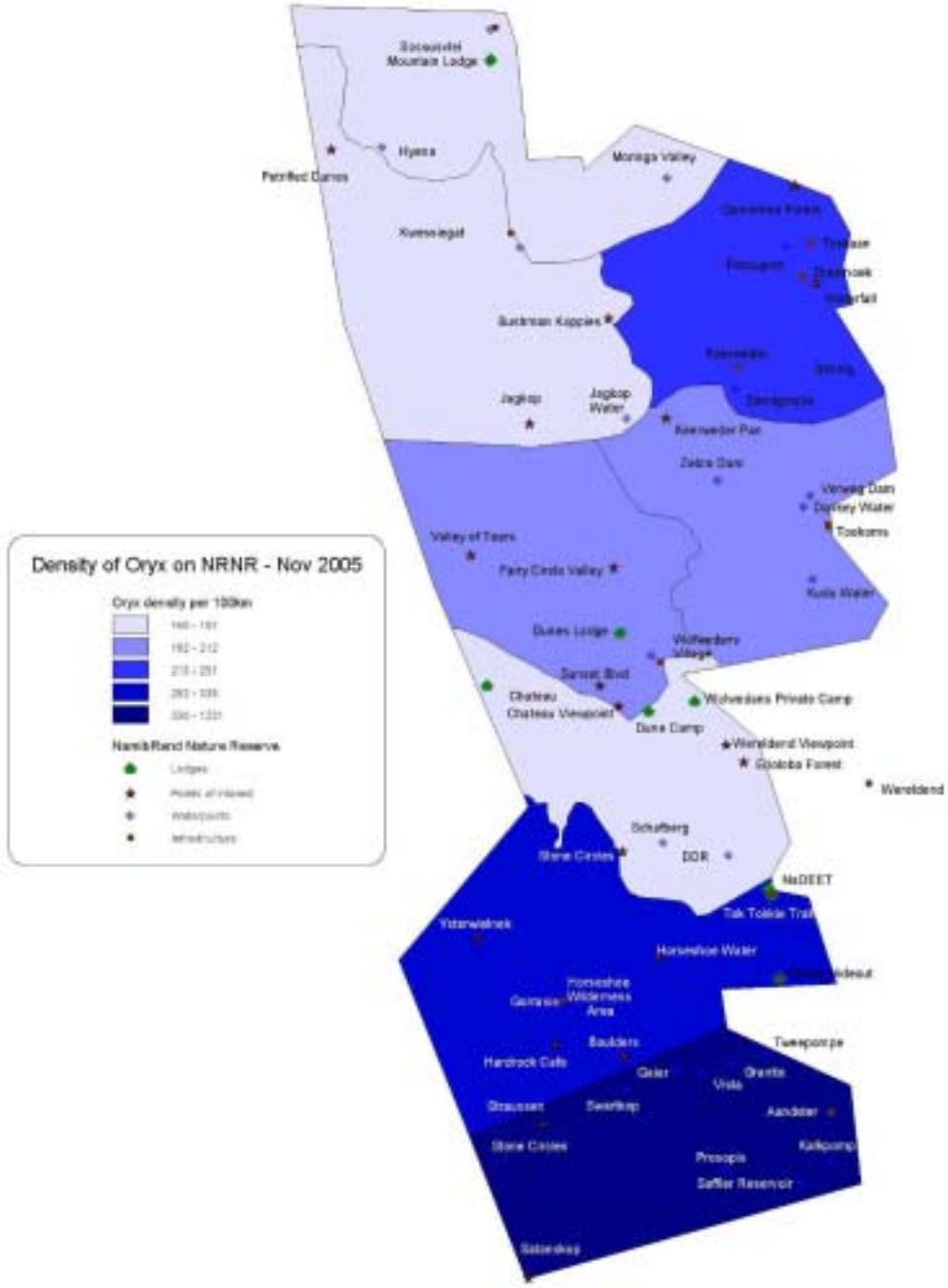
Total Numbers Of Game			
Species	**No. Seen under 500m**	**No. Corrected For Area**	**Total No. Corrected For Species 2004**
Gemsbok	982	3,988	9,571
Springbok	1,498	5,754	16,688
Kudu	64	318	827
Steenbok	2	10	100
Burchells Zebra	59	259	519
Ostrich	102	403	846
Blesbok	1		10*
Red Hartebeest	4		50*
Total	**2,712**	**10,733**	**28,551**

** numbers of these species are known*

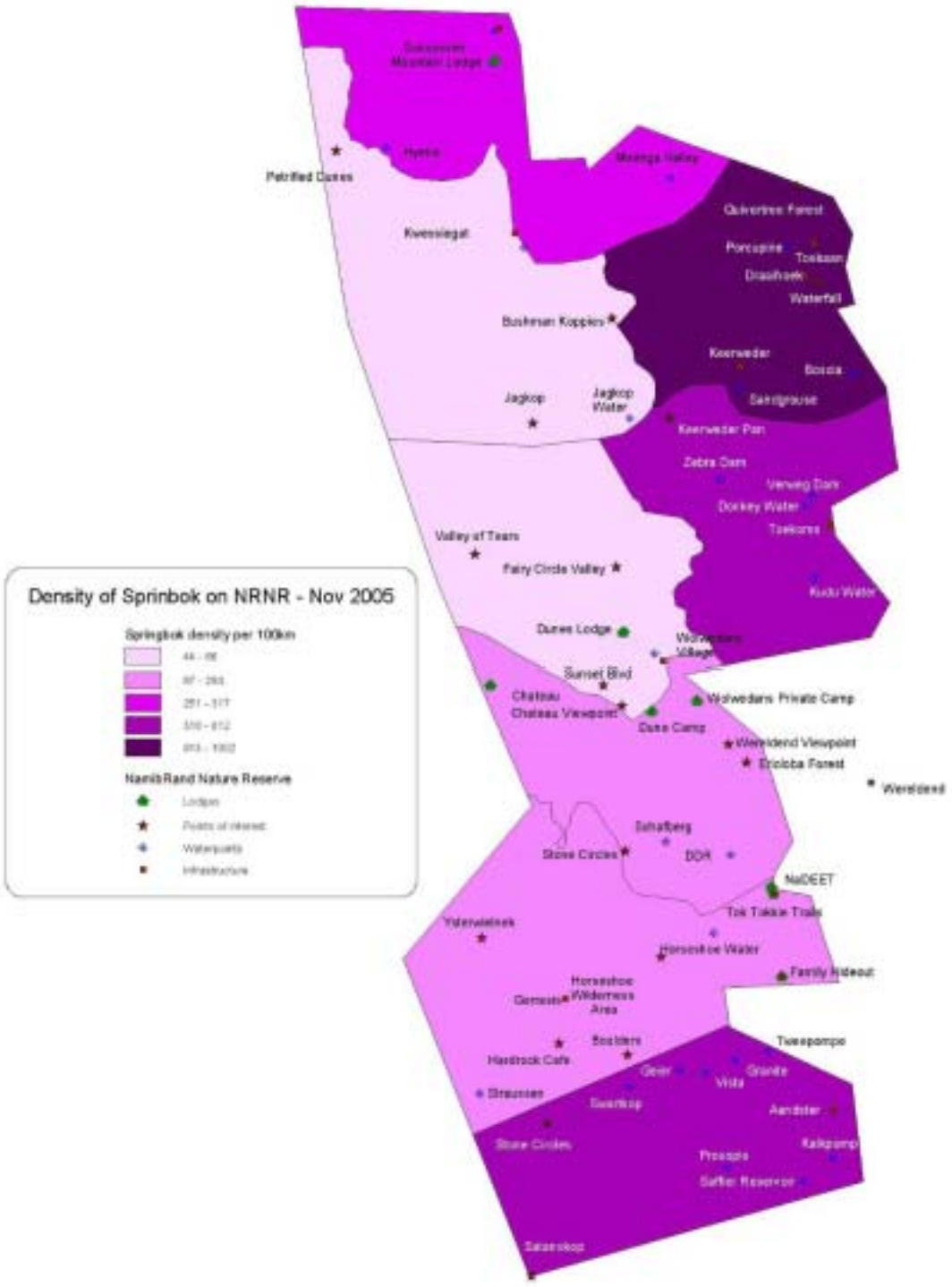
Wildlife Distribution

The following section presents distribution maps for oryx, springbok, kudu, Burchell's zebra and ostrich.

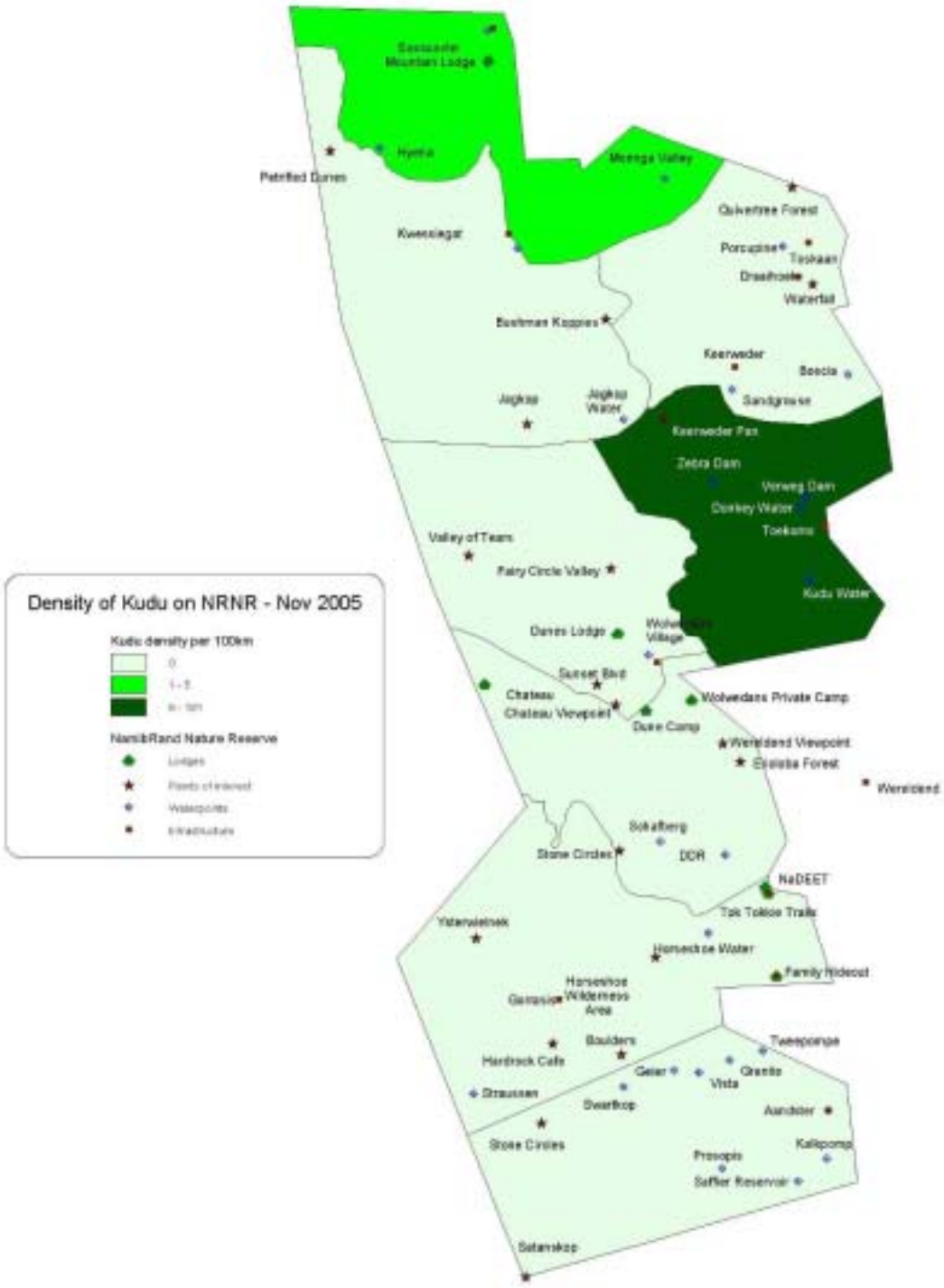
Map 1: *Distribution of Oryx*



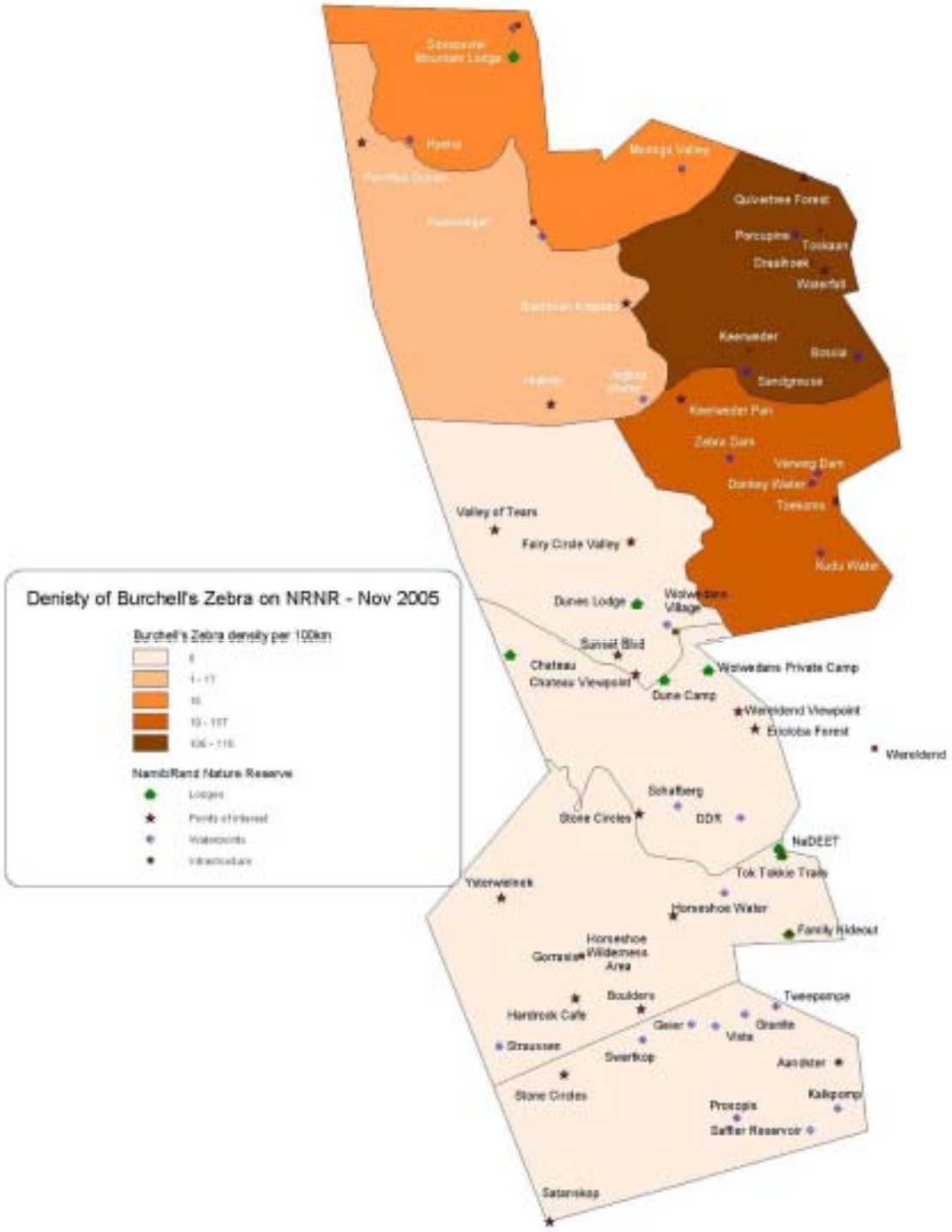
Map 2: *Distribution of Springbok*



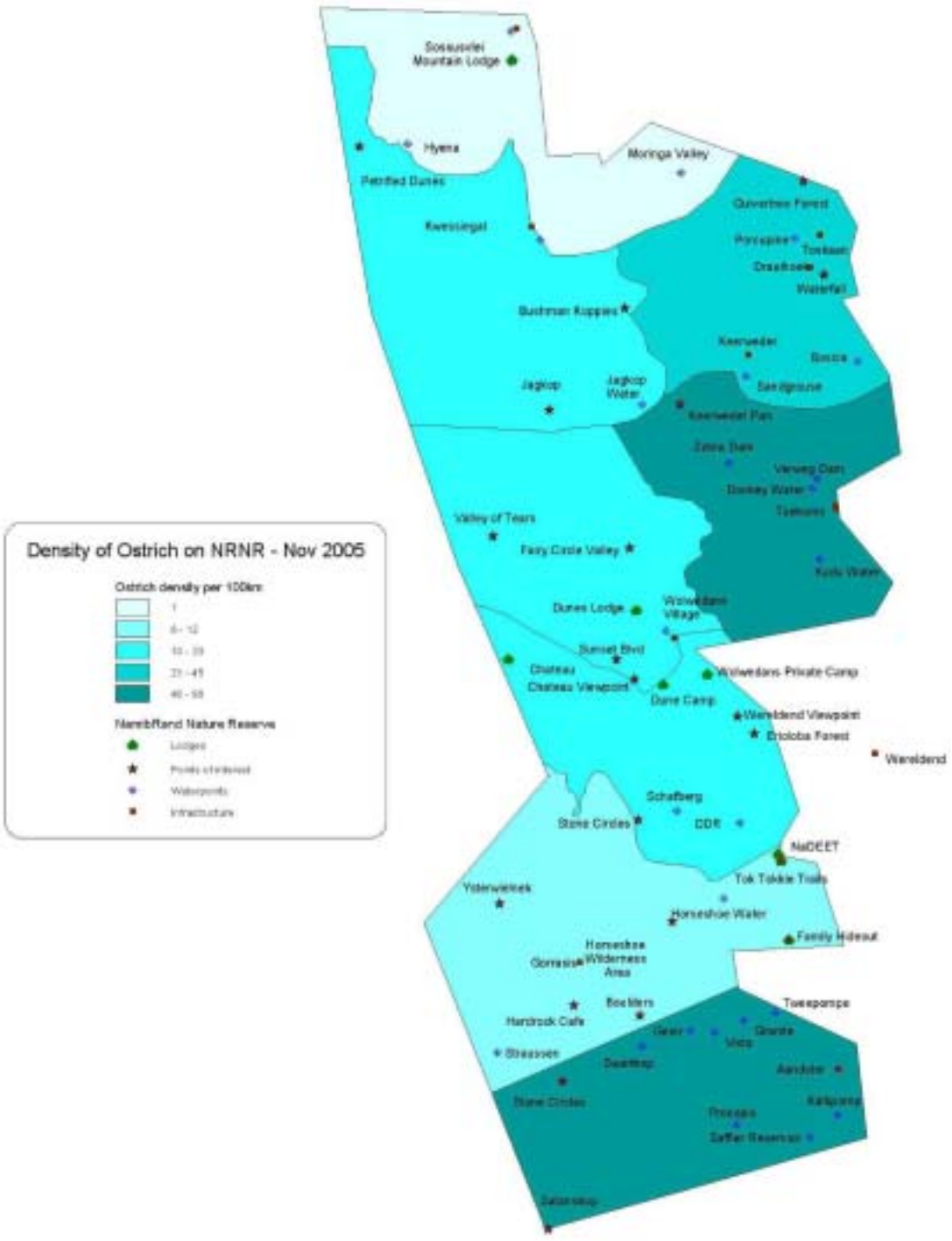
Map 3: *Distribution of Kudu*



Map 4: *Distribution of Burchell's Zebra*



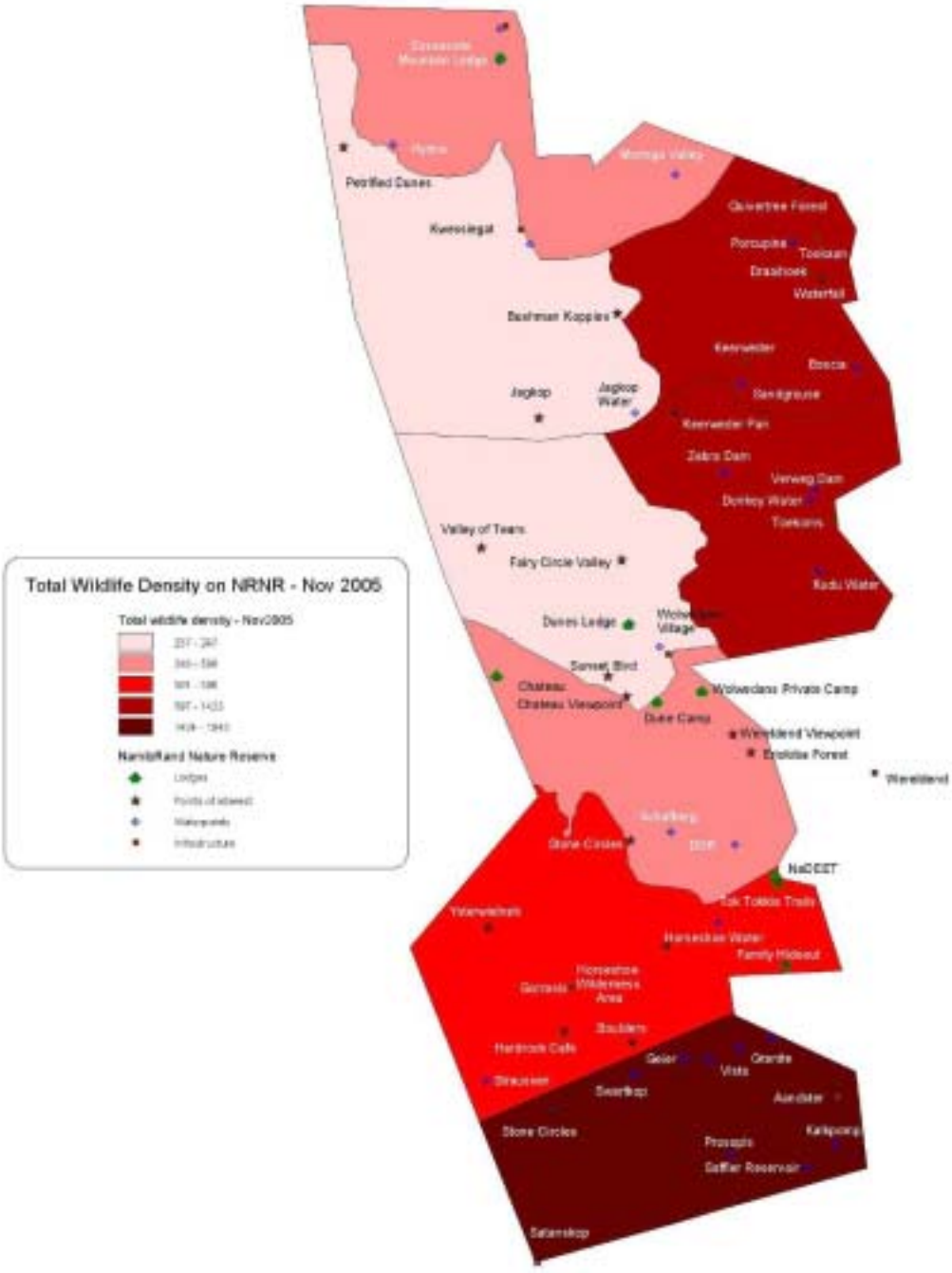
Map 5: *Distribution of Ostrich*



Total Wildlife Density

Map 6 illustrates the total density of wildlife on the NamibRand Nature Reserve on 4 and 5 November 2005. Game densities in the eastern and most southern parts of the Reserve have increased exponentially, while densities in the west are significantly lower than in June 2005.

Map 6: *Total Wildlife Density*



Data Analysis

This section provides some analysis of the results data as listed above.

Population Estimates

Table 11 shows data from the November 2005 count compared to data from the June 2005 count. This data is illustrated in Figure 1.

Table 11:

Species	Nov-05			Jun-05			Percentage Change
	No. Seen under 500m	No. Corrected For Area	Total No. Corrected For Species Nov 2005	No. Seen under 500m	No. Corrected For Area	Total No. Corrected For Species June 2005	
Gemsbok	982	3,988	9,571	801	3,085	7,405	**23%**
Springbok	1,498	5,754	16,688	1,351	4,833	14,016	**16%**
Kudu	64	318	827	25	112	290	**65%**
Steenbok	2	10	100	2	5	53	**47%**
Burchells Zebra	59	259	519	29	145	290	**44%**
Ostrich	102	403	846	89	371	780	**8%**
Blesbok*	1		11	10		10	**9%**
Red Hartebeest*	4		55	3		50	**9%**
Total	**2,712**	**10,733**	**28,617**	**2,310**	**8,602**	**22,895**	**20%**

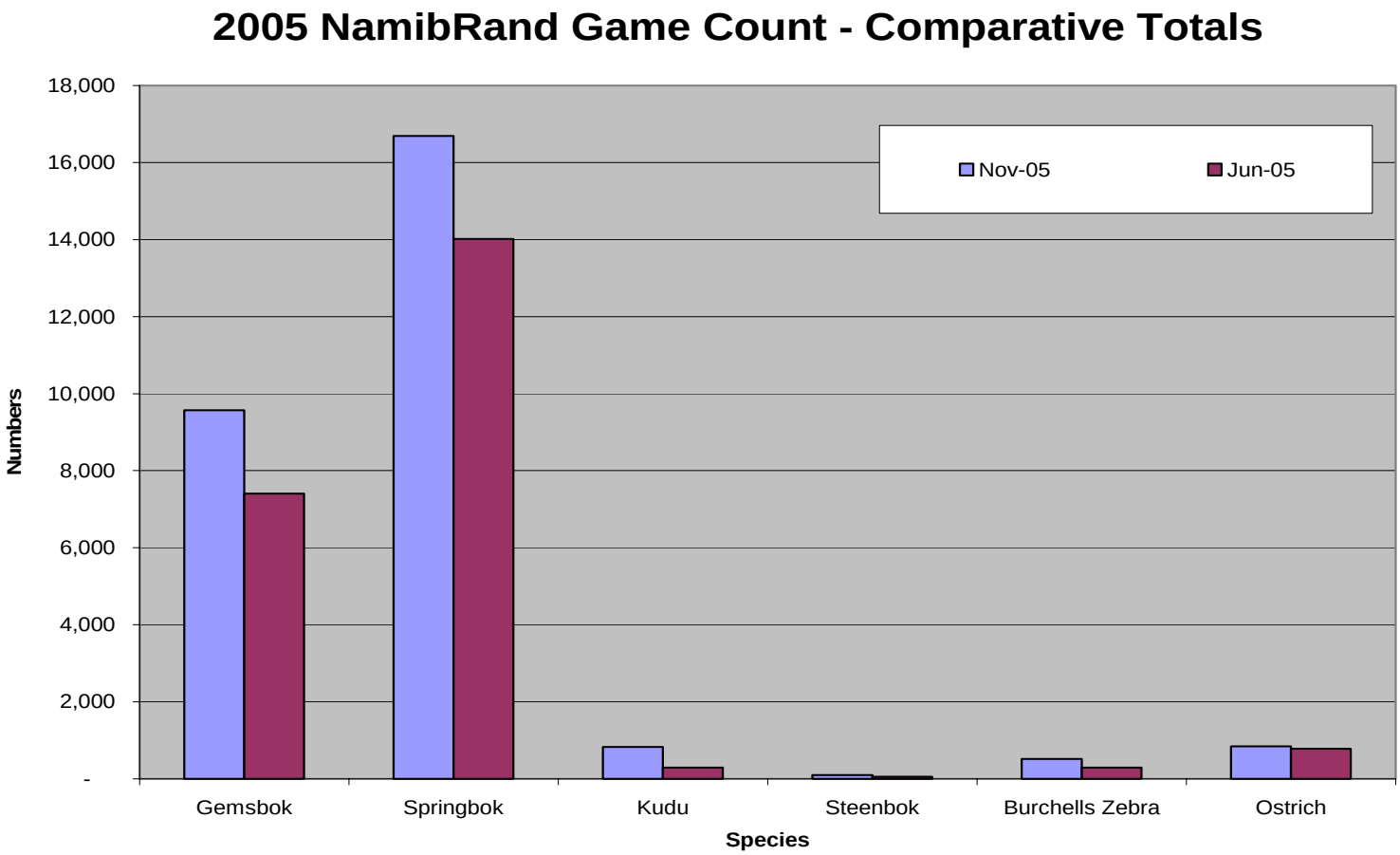
** numbers of these species are known*

Comparing the data from the November 2005 count to June 2005 we note that the overall population estimate has increased by 20%. An acceptable growth rate for large mammals is 40% per year. Data must be qualified by stating that this data represents a time frame of 6 months.

Some large increases in population estimates, e.g. steenbok numbers increasing from 53 to 100, although the actual number of animals remain the same, can be attributed to two causes:

1) The two animals actually seen were seen on different routes. In June 2005 the animals were seen on routes 2 and 5, these routes have area correction factors of 3.02 and 2.30 respectively. For this game count the two animals were seen only on route 6, which has a correction factor of 5.01.
2) Data is insufficient for an accurate estimate. Not enough data was collected to determine a viable population estimate for steenbok.

Figure 1:



Comments

It is worth reiterating at this stage that management decisions are not based on population estimate increases, but rather on wildlife trends and distribution. This data is obtained from actual sightings. Some people may disagree with the methodology used, e.g. species correction factors, however data obtained from the November 2005 is consistent in design with data from the June 2005 count. The data is therefore standardized and can be compared.

Although a 20% increase in population is not considered abnormal for wildlife growth rates we must remember that we dealing with a hyper-arid ecosystem. Although the pro-Namib system is a dynamic environment where we can expect "boom or bust" scenarios, a 20% growth rate should be considered the maximum manageable increase under the current favorable grazing conditions.

It is also worth noting that this increase is not only due to natural growth but also largely due to the west-east migration of desert-adapted mammals in the region. Relationships between the NamibRand Nature Reserve and the Namib-Naukluft Nation Park, as well as with our "like-minded" neighbors are therefore of crucial importance.

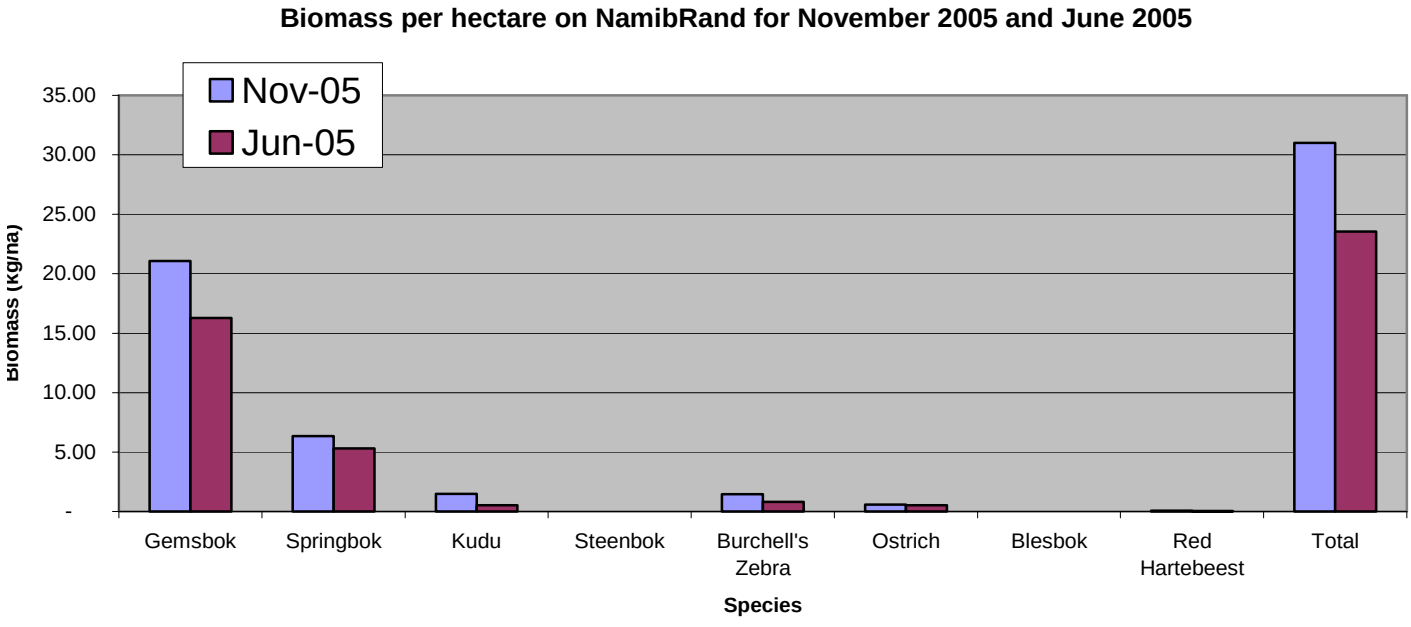
Biomass Estimates

Table 12 and Figure 2 below show wildlife biomass on the NamibRand Nature Reserve for November and June 2005.

Table 12:

Wildlife numbers and wildlife biomass on NamibRand for November 2005 and June 2005							
Wildlife species	**Mean mass (kg)**	**Nov-05**			**Jun-05**		
		Estimated wildlife numbers from Nov 05 game count	**Species biomass (kg)**	**Biomass per ha (kg) Nov**	**Estimated wildlife numbers from June 05 game count**	**Species biomass (kg)**	**Biomass per ha (kg) June**
Gemsbok	220	9,571	2,105,678	21.06	7,405	1,629,085	16.29
Springbok	38	16,688	634,141	6.34	14,016	532,622	5.33
Kudu	180	827	148,941	1.49	290	52,205	0.52
Steenbok	11	100	1,101	0.01	53	587	0.01
Burchell's Zebra	280	519	145,196	1.45	290	81,294	0.81
Ostrich	68	846	57,512	0.58	780	53,042	0.53
Blesbok	100	11	1,100	0.01	10	1,000	0.01
Red Hartebeest	130	55	7,150	0.07	50	6,500	0.07
Total		**28,617**	**3,100,819**	**31.00**	**22,895**	**2,356,336**	**23.55**

Figure 2:



Comments

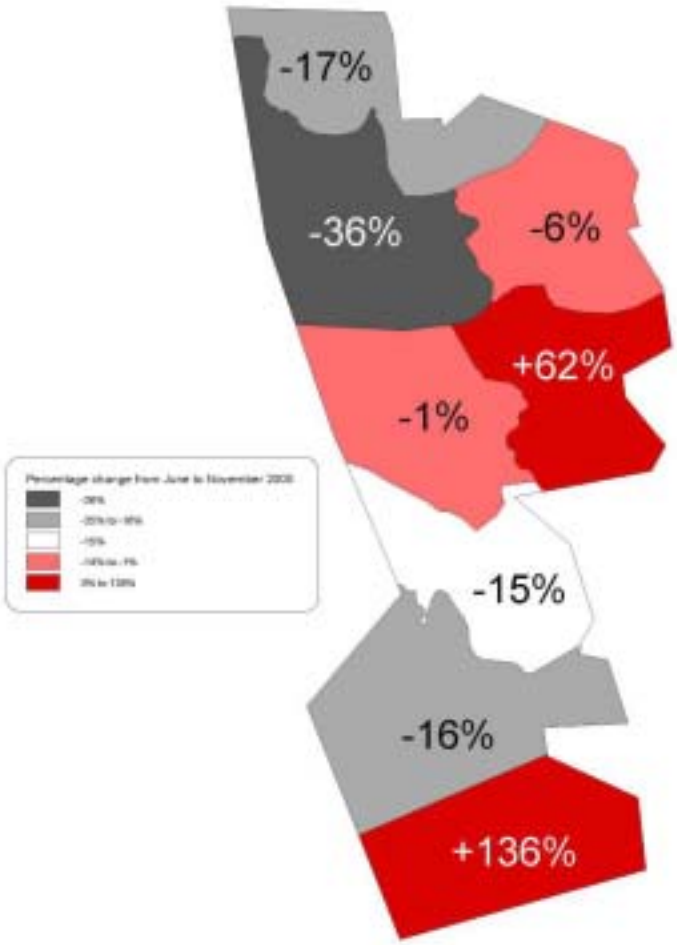
31kg per hectare is considered on the high side for desert ecosystems although present grazing conditions can sustain these high numbers. In addition this is a dynamic ecosystem and desert adapted wildlife such as oryx and springbok can migrate in search of water and better grazing if needed. However introduced species such as the Burchell's Zebra need to managed and as is evident by their relatively high biomass, and taking into consideration the small area onto which they impact, these numbers have to be reduced.

The capture operation originally scheduled for June / July this year had to be cancelled due to unforeseen circumstances and this event is now scheduled for March 2006. It would be wise to also consider the removal of some oryx and springbok during this capture

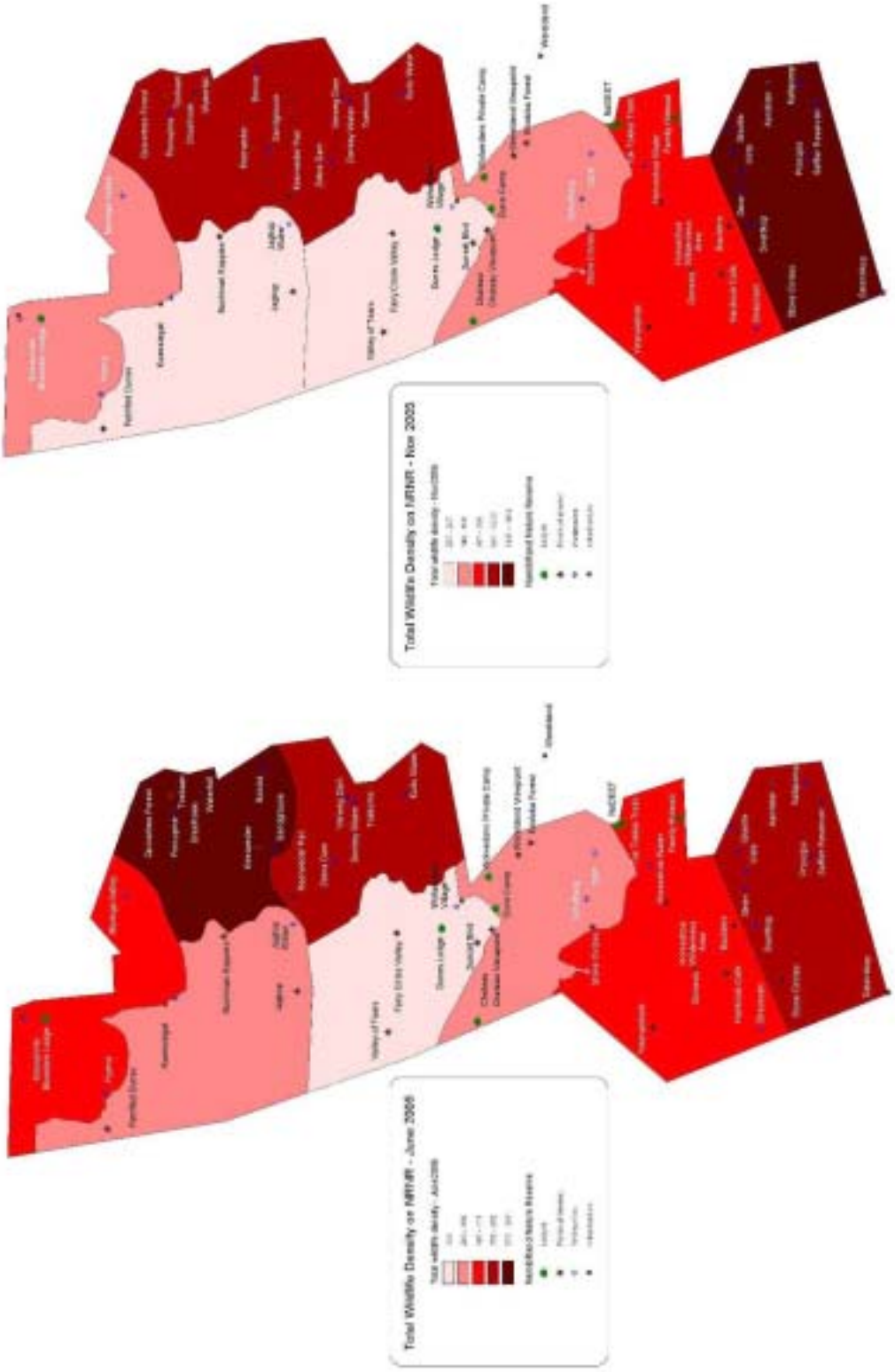
Wildlife Distribution

Map 7 illustrates the change in wildlife distribution between June 2005 and November 2005.

Map 7:



For the sake of comparing the total wildlife distribution, map 7 is compared to the total wildlife density from June 2005.



Comments

By comparing the wildlife distributions from June to November 2005 it is evident that animals have left the western areas of the Reserve and are now concentrating in the eastern and far southern areas of the Reserve. Not only is the distribution in these areas higher, but so too are the concentrations of game. Note that the percentage of change in the Aandster area is +136%, this means that almost three times as many animals were counted here than during the last census.

A direct correlation between this distribution and the availability of grazing and water can be made. Those areas with the highest concentrations of wildlife received the best rain during the 2004 / 2005 rainy season and also still have the most amount of grazing left.

Population Change

As described in the methodology section, data needs to be standardized in order to make comparisons. Table 13 below shows this data for animals seen per 100km driven

Table 13:

November 2005 - Species sightings per 100km

Route	Length Of Route (km)	Species											
		Gemsbok		Springbok		Kudu		Steenbok		B.Zebra		Ostrich	
		No	P/100km	No	P/100km	No	P/100km	No	P/100km	No	P/100km	No	P/100km
1	55.8	85	152	177	317	3	5	0	0	10	18	4	7
2	53.8	135	251	539	1002	0	0	0	0	59	110	24	45
3	65.2	95	146	43	66	0	0	0	0	11	17	12	18
4	50.2	88	175	22	44	0	0	0	0	0	0	9	18
5	70	113	161	164	234	0	0	0	0	0	0	14	20
6	34.5	73	212	280	812	66	191	2	6	37	107	33	96
7	51.7	173	335	129	250	0	0	0	0	0	0	6	12
8	54	665	1231	343	635	0	0	0	0	0	0	41	76
Total	**435.2**	**1427**	**328**	**1697**	**390**	**69**	**16**	**2**	**0**	**117**	**27**	**143**	**33**

Table 14 compares the total number of animals seen per 100km driven for consecutive game counts held.

Table 14:

	Dec 2004	June 2005	Nov 2005	% Change (Nov & Jun 05)
Gemsbok	248	184	328	78.38
Springbok	321	330	390	18.18
Kudu	8	7	16	137.93
Burchell's Zebra	29	23	27	14.71
Ostrich	27	35	33	-5.30

Tables 13 and 14 put the game count data into a different perspective and help us to equate the data in a more manageable or understandable format. We can, for example, determine that if we drive 100km, or from the top to the bottom of the Reserve, we will see 328 oryx in that distance. This is the true test of the data and helps us put the huge numbers into perspective.

Percentage change in the last column of Table 14 indicates the increase or decrease (-) in wildlife trend.

Figures 3 and 4 translate the data listed in Tables 13 and 14 into graph format for easy interpretation.

Figure 3:

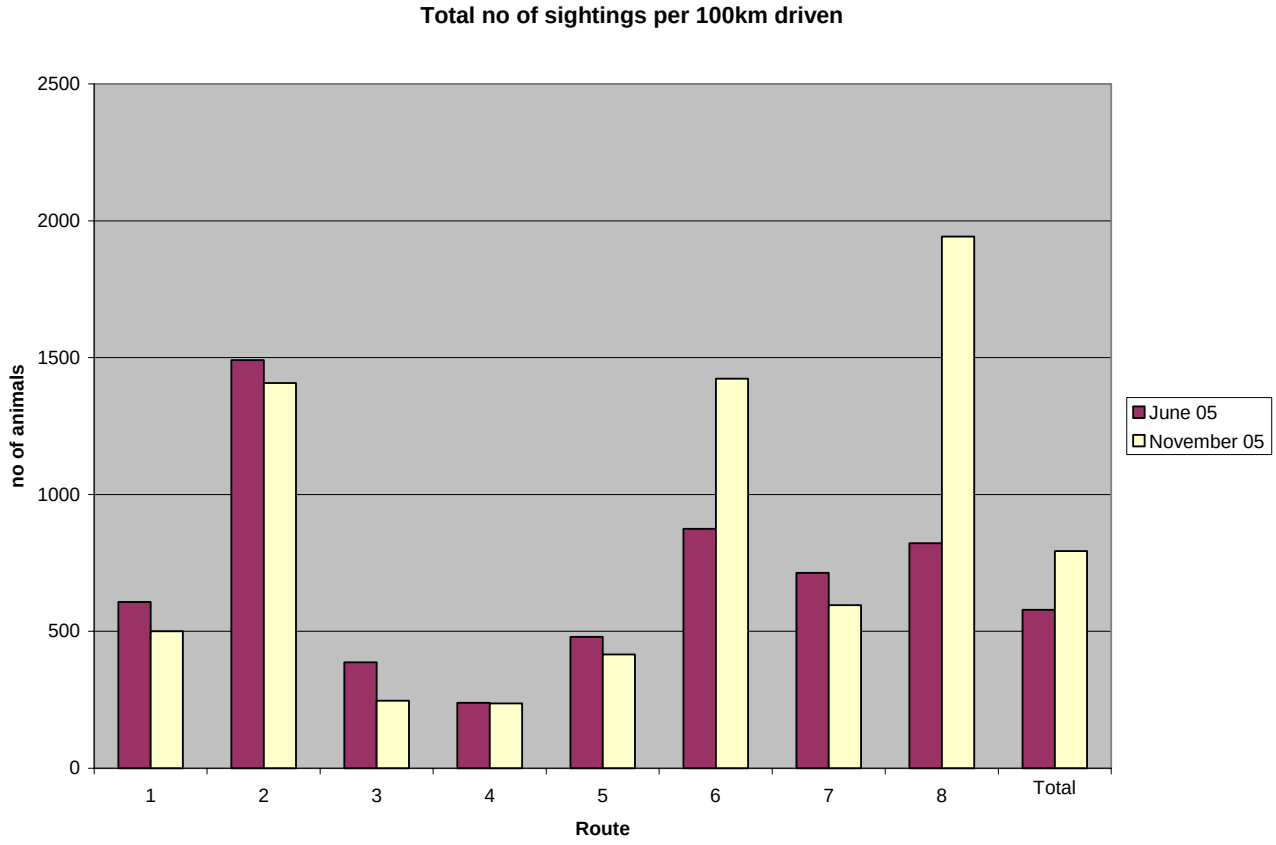
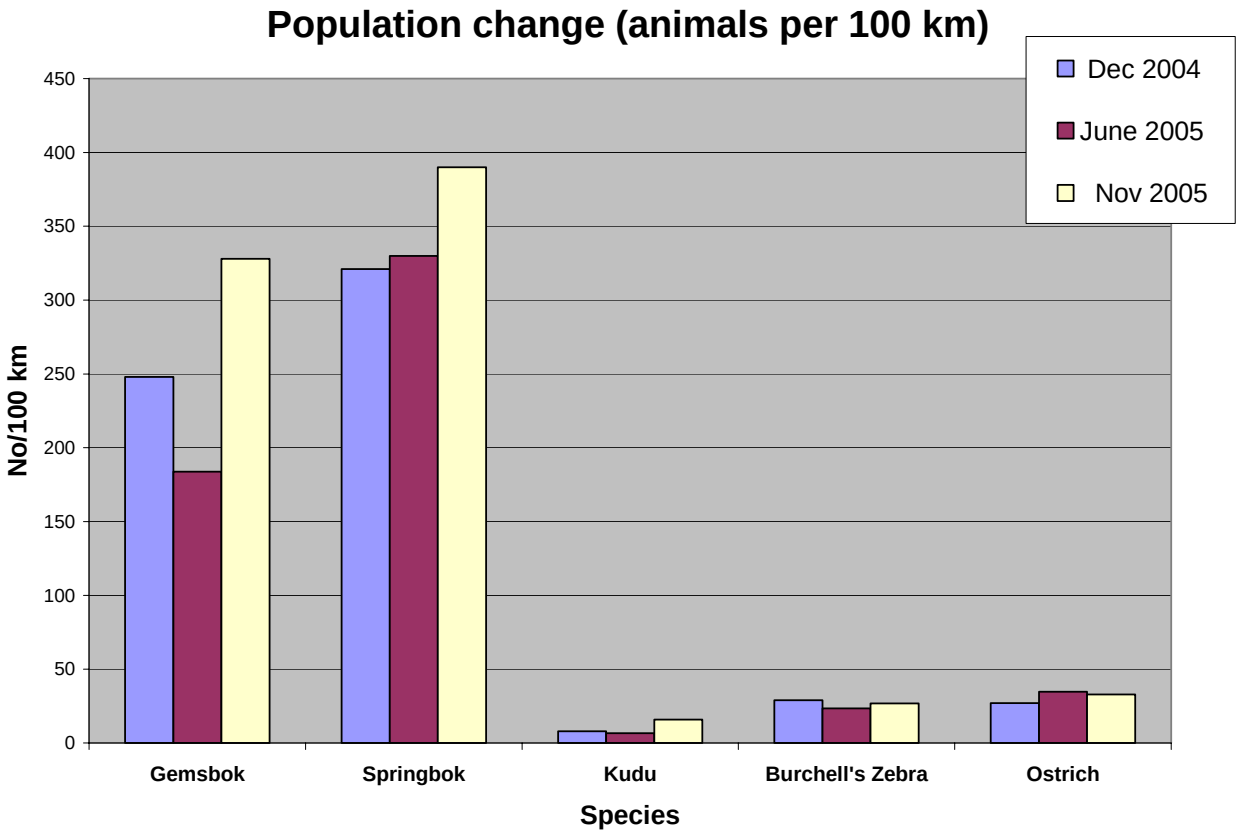


Figure 4:



Comments

As mentioned previously, only actual sightings are used to analyze this data. For this reason data from the December 2004 can be used. Although count zones, routes and correction factors were adjusted during as from the June 2005 game count, data for the actual sightings per 100km driven remains the same and can therefore be used.

Interesting to note then, is that oryx numbers were down in June 2005, compared to the December 2004 and November 2005 figures. Can this drop be attributed to the west-to-east migration of oryx in and out of the Namib-Nakluft National Park?

Acknowledgements

NamibRand staff would like to thank all those who helped with this game count. Although this census was conducted as an “in-house” affair we would not have been able to conduct the count over only two days with out their help. Special mention is thus extended to Wolwedans – for making two teams available, TokTokkie Trails and NaDEET – one team and to the “crew” from Kwessiegat – Chris Berker, Carol Alberton and Hilda de Villiers.