Wildlife Surveys in Selected Northern Botswana Concessions 2013 - 2015

A Khwai Community Trust partnership with Round River Conservation Studies and Okavango Research Institute

The diverse wildlife of northern Botswana is valued globally, nationally and locally. After aerial surveys indicated population declines of several species, a workshop of local and regional experts was convened in 2012. One core recommendation from this group was improving community-based wildlife monitoring. In 2013, the Okavango Research Institute partnered with Round River to implement these recommendations with the Khwai Community Trust.

Survey Methods

Complementing the on-going MOMS monitoring, these wildlife surveys are called DADS, 'Density and Demography Surveys'. Khwai guides working with Round River conducted road-based surveys from 4x4 vehicles. The guides are very important as they provide expertise of the area and wildlife. In turn, they are trained in the monitoring techniques, equipment and data management.

Along each road transect, wildlife are counted and their location documented using a GPS, compass and laser range finder to measure the distance to the animal. Using the data from these wet and dry seasons surveys, we are able to calculate population density and sex and age composition of key species. Bird surveys where also undertaken to identify and count birds of concern. These regional bird surveys were recommended by the 2012 workshop and add to the Birdlife Botswana national database.

Wildlife Survey Results

During DADS over 30 species were observed (Table 1). From the data, we calculated what proportion of all animals we likely actually saw at different distances from the road (Figure 1). This is important as animals that are further away are harder to see and this allowed us to analyze the data correctly. For some species, we were able to calculate their density (Figure 2, Table 2). This allows us to monitor species numbers over time. Based on this work we have recommend ways to improve and make the information even more useful.

Recommendations

- Increase the distance surveyed each season so density estimates can be made for more species
- Where needed, expand the sampling across the concession area
- Always have 4 well-trained people on every survey
- When collecting age and sex data, include all animals in each group
- Continue training community guides

Table 1. Some of the species counted during the DADS surveys.

Species	Dry 2013	Dry 2015	Wet 2014	Wet 2015
Buffalo	13	72	1	2
Baboon	16	53	43	82
Duiker		1		
Reedbuck	11	23		28
Crocodile	4	2		
Elephant	138	158	101	102
Giraffe	91	81	16	92
Hippo	126	161	15	194
Impala	1245	1762	475	1531
Kudu	88	152	16	82
Leopard	1	7		
Lion		5	6	6
Ostrich		11		14
Red Lechwe	39	133	21	77
Roan	8	19		
Sable	3		1	
Steenbok	12	20	3	2
Tsessebe	23	25		7
Warthog	53	68	15	40
Waterbuck	72	150		94
Wild Dog	14	2		7
Wildebeest	3	50	1	3
Zebra	105	172	59	197

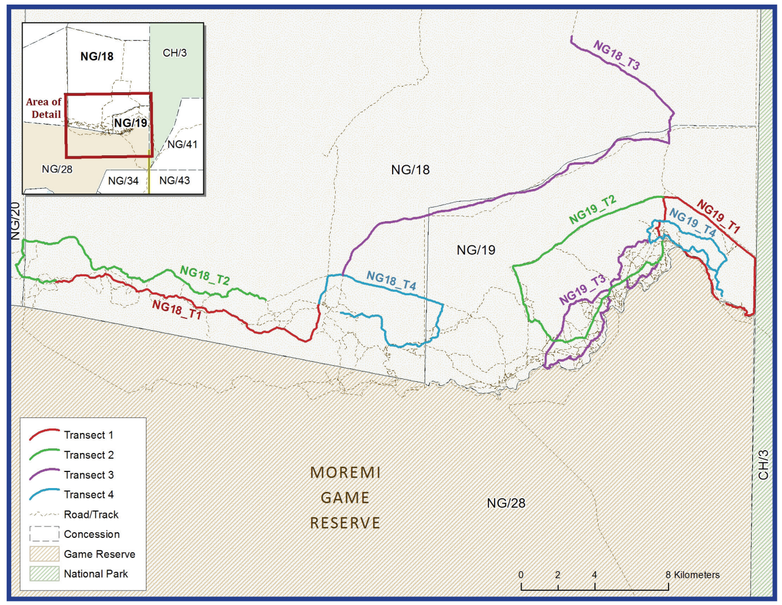


Figure 1. The further an animal is from the road, the less likely it was counted in the survey.

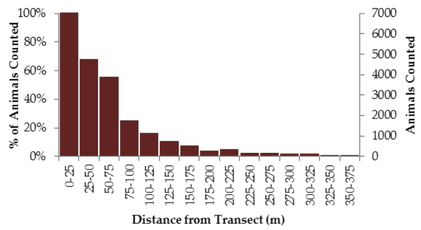
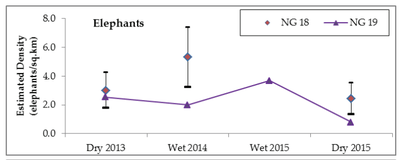


Figure 2. Densities (animals/sq.km) for selected species were estimated for NG 18 and NG 19.



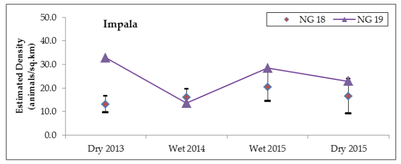


Table 2. Densities (animals/sq.km) shown for NG 18/NG 19 concessions for species with sufficient data. A "." Indicates there was not enough data to estimate density.

	NG 18 / NG19			
Species	Dry 2013	Wet 2014	Wet 2015	Dry 2015
Reedbuck			0.80 / .	0.45 / .
Elephant	3.00 / 2.53	5.30 / 2.00	. / 3.67	2.42 / 0.80
Giraffe	2.66 / .	1.15 / .	2.53 / .	0.37 / .
Hippo			. / 3.97	1.38 / 1.64
Impala	13.06 / 32.80	15.98 / 13.61	20.49 / 28.41	16.53 / 22.81
Kudu	2.00 / 1.51		1.03 / 1.45	1.53 / 2.05
Steenbok				. / 0.42
Warthog	. / 0.86		. / 0.73	. / 1.17
Waterbuck			. / 1.83	. / 1.26
Zebra			. / 4.10	1.27 / 2.56

Bird Surveys

Bird abundance and distribution can provide important information about the health of habitats. Diverse and healthy bird populations are also important for the tourists who travel to northern Botswana to see its bird life.

Species	Dry 2013	Wet 2013	Wet 2014	Wet 2015	Dry 2015
Bateleur	11	30	19	79	37
Cape vulture			1	6	
Hooded vulture	3			3	1
Kori bustard			1	1	1
Lappet-faced vulture	1		2	1	5
Martial eagle	3		1	4	
Slaty Egret	1	1	1	2	5
Southern ground hornbill	32	4	11	10	10
Vulture spp.				45	2
Wattled crane	10	21	2	23	2
White-backed vulture	73	34	18	89	50
White-headed vulture				1	

Acknowledgments

We wish to thank the Khwai Community Development Trust for investing in wildlife monitoring. We thank the Khwai guides who made these surveys possible and whose enthusiasm and expertise greatly contributed to the quality of the information collected. We also thank the Southern Africa Regional Environmental Program for developing and initiating the surveys.

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Wildlife Surveys in Selected Northern Botswana Concessions 2013 - 2015

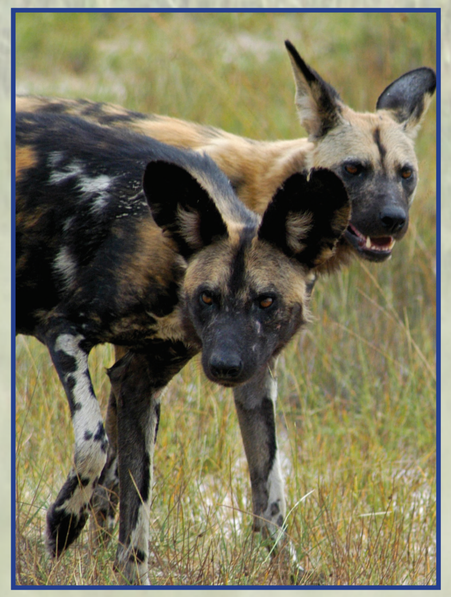
A Mababe Zokotsama Community Trust partnership with Round River Conservation Studies and Okavango Research Institute

The diverse wildlife of northern Botswana is valued globally, nationally and locally. After aerial surveys indicated population declines of several species, a workshop of local and regional experts was convened in 2012. One core recommendation from this group was improving community-based wildlife monitoring. In 2013, the Okavango Research Institute partnered with Round River to implement these recommendations with the Mababe Zokotsama Community Trust.

Survey Methods

Complementing the on-going MOMS monitoring, these wildlife surveys are called DADS, 'Density and Demography Surveys'. Mababe guides working with Round River conducted road-based surveys from 4x4 vehicles. The guides are very important as they provide expertise of the area and wildlife. In turn, they are trained in the monitoring techniques, equipment and data management.

Along each road transect, wildlife are counted and their location documented using a GPS, compass and laser range finder to measure the distance to the animal. Using the data from these wet and dry seasons surveys, we are able to calculate population density and sex and age composition of key species. Bird surveys where also undertaken to identify and count birds of concern. These regional bird surveys were recommended by the 2012 workshop and add to the Birdlife Botswana national database.



Wildlife Survey Results

During DADS over 30 species were observed (Table 1). From the data, we calculated what proportion of all animals we likely actually saw at different distances from the road (Figure 1). This is important as animals that are further away are harder to see and this allowed us to analyze the data correctly. For some species, we were able to calculate their density (Figure 2). This allows us to monitor species numbers over time. Based on this work we have recommend ways to improve and make the information even more useful.

Recommendations

- Increase the distance surveyed each season so density estimates can be made for more species
- Where needed, expand the sampling across the concession area
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Roan	8	19		
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Figure 1. The further an animal is from the road, the less likely it was counted in the survey.

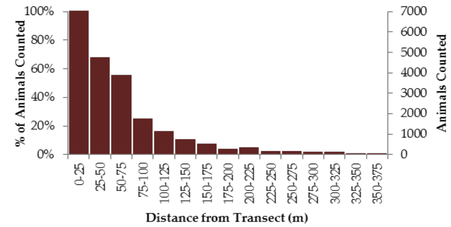
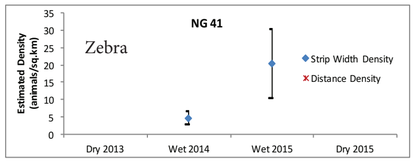
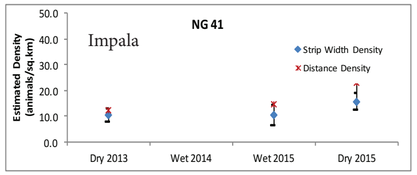
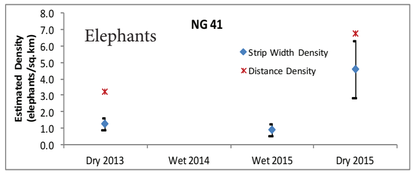
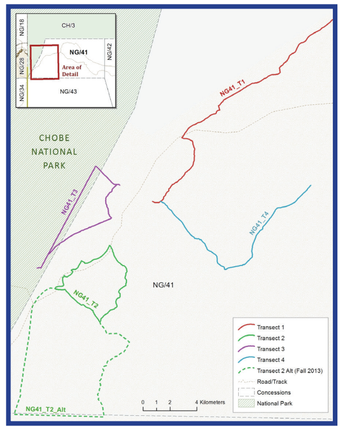


Figure 2. Densities (animals/sq.km) for selected species were estimated 2 different ways for some species: strip width estimates are shown as "diamond symbol" and density stimates with standard errors are shown in "X symbol".









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Wildlife Surveys in Selected Northern Botswana Concessions 2013 - 2015

A Sankuyo Tshwaragano Management Trust partnership with Round River Conservation Studies and Okavango Research Institute

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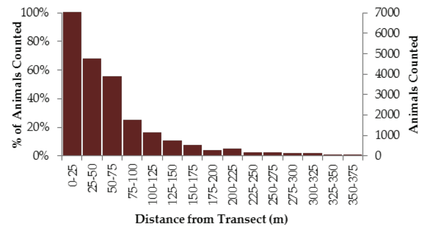

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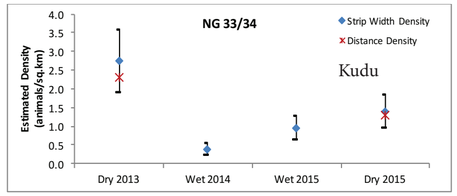

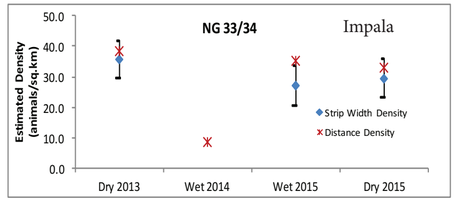

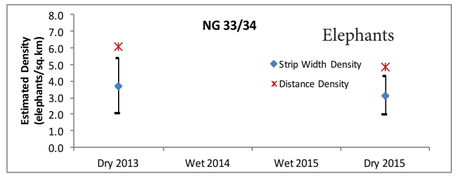

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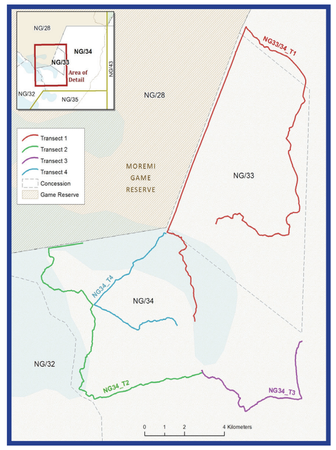

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Martial eagle	3		1	4	
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A Community Trust partnership with Round River Conservation Studies and Okavango Research Institute

The diverse wildlife populations of these regions are highly valued globally, nationally and locally. In January 2012, a workshop was held to discuss the possibility of declining wildlife. The recommendations of attending local and regional experts included improving community based wildlife monitoring.

In 2013, Okavango Research Institute and Round River Conservation Studies partnered with community guides from Sankuyo Tshwaragano Management Trust, Mababe Zokotsama Community Development Trust, Khwai Zou Development Trust, and the Chobe Enclave Community Trust to implement these recommendations.

Survey Methods

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Wildlife Survey Results

During the DADS surveys, 300 - 500 km were driven and 30 species were observed. For some species, we were able to calculate their density (Table 1). This allows us to monitor species numbers over time. Based on this work we have recommend several ways to improve the monitoring and make the information even more useful.

Recommendations

- Increase the distance surveyed each season so density estimates can be made for more species
- Where needed, expand the sampling across the concession area
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Table 1. Strip width and distance-based line transect density estimates for selected species in concessions areas surveyed between 2013-2015; blank cells indicate no survey completed; dashes indicate survey completed but unable to generate density estimates within required CV of 0.5 or the species was not seen on the survey. D = estimated density (square km), SE = standard error; DF = degrees of freedom; CV is the % Coefficient of Variation.

Elephant		Dry 2013				Wet 2014				Wet 2015				Dry 2015			
		D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV
CH 1	Strip Width									-	-	-	-	2.48	1.10	12	44
CH 2	Strip Width									-	-	-	-				
NG 18	Strip Width	3.00	1.23	6	41	5.30	2.07	6	39	-	-	-	-	2.42	1.09	12	45
	Distance Ana.	3.14	0.96	11	31	3.14	0.96	12	34	-	-	-	-	-	-	-	-
NG 19	Strip Width	2.53	0.76	10	30	1.99	0.75	6	37	3.67	1.34	12	36	0.80	0.33	12	41
	Distance Ana.	-	-	-	-	1.86	0.79	4	42	2.90	1.53	7	53	1.27	0.57	4	45
NG 33/34	Strip Width	3.70	1.69	12	46	-	-	-	-	-	-	-	-	3.13	1.18	12	38
	Distance Ana.	6.05	2.29	5	38	0.45	0.14	4	31	-	-	-	-	4.87	1.62	13	33
NG 41	Strip Width	1.29	0.39	11	30	-	-	-	-	0.91	0.42	12	46	4.59	1.78	12	39
	Distance Ana.	3.25	1.01	37	31	-	-	-	-	-	-	-	-	6.76	1.96	10	29

Kudu		Dry 2013				Wet 2014				Wet 2015				Dry 2015			
		D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	
CH 1	Strip Width									-	-	-	-	0.55	0.26		12
CH 2	Strip Width									-	-	-	-				
NG 18	Strip Width	2.00	0.88	6	44	0.62	0.41	6	66	1.03	0.46	9	44	1.53	0.46		12
	Distance Ana.	2.77	0.61	18	22									-	-	-	
NG 19	Strip Width	1.51	0.45	10	30	-	-	-	-	1.45	0.46	12	32	2.05	0.49		12
	Distance Ana.	1.01	0.35	8	34									2.08	0.91		4
NG 33/34	Strip Width	2.76	0.87	12	31	0.40	0.16	6	40	0.96	0.33	12	35	1.41	0.47		12
	Distance Ana.	2.33	1.14	4	49									1.32	0.57		6
NG 41	Strip Width	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Distance Ana.	-	-	-	-									-	-	-	

Impala		Dry 2013				Wet 2014				Wet 2015				Dry 2015			
		D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV
CH 1	Strip Width									-	-	-	-	1.63	0.70	12	43
CH 2	Strip Width									-	-	-	-				
NG 18	Strip Width	13.06	3.39	6	26	15.98	3.48	6	22	20.49	6.10	9	30	16.53	7.32	12	44
	Distance Ana.	19.31	3.74	6	19	-	-	-	-	22.81	11.21	5	49	-	-	-	-
NG 19	Strip Width	32.80	10.25	10	31	13.61	4.65	6	34	28.41	6.83	12	24	22.81	7.65	12	34
	Distance Ana.	17.00	10.08	7	25	20.02	7.08	18	33	38.07	13.19	4	35	29.86	10.22	4	34
NG 33/34	Strip Width	35.78	6.38	12	18	6.60	1.17	6	18	27.06	6.62	12	24	29.60	6.65	12	22
	Distance Ana.	38.42	6.69	7	17	8.66	2.57	30	30	35.27	13.72	4	39	32.79	12.08	3	37
NG 41	Strip Width	10.66	2.89	11	27	-	-	-	-	10.77	4.30	12	40	15.99	3.40	12	21
	Distance Ana.	12.51	5.90	5	47	-	-	-	-	-	-	-	-	23.10	9.75	4	42

Giraffe		Dry 2013				Wet 2014				Wet 2015				Dry 2015			
		D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV
CH 1	Strip Width									0.65	0.69	6	107	0.46	0.22	12	48
CH 2	Strip Width									-	-	-	-				
NG 18	Strip Width	2.66	0.88	6	33	1.15	0.55	6	48	2.53	1.10	9	43	0.37	0.14	12	38
	Distance Ana.	3.15	0.83	42	26	0.62	0.21	6	33	-	-	-	-	-	-	-	-
NG 19	Strip Width	-	-	-	-	-	-	-	-	-	-	-	-	0.71	0.33	12	47
	Distance Ana.	-	-	-	-	-	-	-	-	-	-	-	-	1.06	0.41	13	39
NG 33/34	Strip Width	1.28	0.42	12	33	-	-	-	-	2.29	0.78	12	34	2.27	1.00	12	44
	Distance Ana.	1.47	0.44	14	30	0.88	0.31	3	36	1.94	0.68	5	35	2.92	0.88	14	30
NG 41	Strip Width	-	-	-	-	-	-	-	-	1.07	0.53	12	49	1.60	0.69	12	43
	Distance Ana.	0.03	0.20	6	30	-	-	-	-	-	-	-	-	1.82	0.68	6	37

Steenbok		Dry 2013				Wet 2014				Wet 2015				Dry 2015			
		D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV
CH 1	Strip Width									-	-	-	-	-	-	-	-
CH 2	Strip Width									0.38	0.16	4	41				
NG 18	Strip Width	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distance Ana.	-	-	-	-									-	-	-	-
NG 19	Strip Width	-	-	-	-	-	-	-	-	-	-	-	-	0.42	0.17	12	39
	Distance Ana.	-	-	-	-									0.65	0.26	5	40
NG 33/34	Strip Width	1.07	0.33	12	31	-	-	-	-	0.25	0.07	12	29	0.77	0.22	12	28
	Distance Ana.	2.11	0.98	4	46									1.33	0.30	7	22
NG 41	Strip Width	0.48	0.20	11	42	-	-	-	-	0.47	0.14	12	29	1.03	0.30	12	29
	Distance Ana.	0.94	0.46	4	49									1.92	0.84	4	44

Warthog		Dry 2013				Wet 2014				Wet 2015				Dry 2015			
		D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV
CH 1	Strip Width									-	-	-	-	0.72	0.23	12	32
CH 2	Strip Width									-	-	-	-				
NG 18	Strip Width	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Distance Ana.	-	-	-	-									-	-	-	-
NG 19	Strip Width	0.86	0.41	10	48	1.04	0.58	6	56	0.73	0.29	12	40	1.17	0.37	12	32
	Distance Ana.	0.95	0.39	6	41									1.55	0.60	4	39
NG 33/34	Strip Width	1.32	0.43	12	33	0.13	0.12	6	89	0.21	0.10	12	47	0.90	0.20	12	22
	Distance Ana.	1.19	0.68	4	57									1.14	0.34	5	30
NG 41	Strip Width	0.56	0.27	11	48	1.85	1.15	6	63	1.42	0.49	12	34	1.31	0.54	12	41
	Distance Ana.	-	-	-	-									-	-	-	-

Zebra		Dry 2013				Wet 2014				Wet 2015				Dry 2015			
		D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV	D	SE	DF	CV
CH 1	Strip Width									-	-	-	-	-	-	-	-
CH 2	Strip Width									-	-	-	-				
NG 18	Strip Width	-	-	-	-	-	-	-	-	-	-	-	-	1.27	0.49	11	38
	Distance Ana.	-	-	-	-	0.59	0.26	2	44	-	-	-	-	1.09	0.49	5	45
NG 19	Strip Width	-	-	-	-	-	-	-	-	4.10	1.61	11	39	2.56	0.73	11	29
	Distance Ana.	-	-	-	-	-	-	-	-	4.49	2.06	4	46	3.18	0.82	26	26
NG 33/34	Strip Width	-	-	-	-	-	-	-	-	2.54	1.14	11	45	2.66	0.97	11	36
	Distance Ana.	0.15	0.07	6	49	0.17	0.07	1	41	2.35	1.02	7	44	1.94	0.91	7	47
NG 41	Strip Width	-	-	-	-	4.87	2.16	5	44	20.51	10.10	11	49	-	-	-	-
	Distance Ana.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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