

Supplemental Material

Human dimensions of human-lion conflict: a pre- and post-assessment of a lion conservation programme in the Okavango Delta, Botswana

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This document contains all supplemental tables which support information presented in the publication: a comparison of key demographic and attitudinal metrics between new and repeat follow-up survey respondents (Table S1), the relevant questions asked during both rounds of surveys (Table S2), respondent demographic data (Tables S3 & S4), and total numbers and valuation of livestock lost to wild carnivores (Tables S5 & S6).

Table S1: Comparison of key demographic factors and attitude metrics between new (n=78) and repeat (n=130) follow-up questionnaire respondents. Percent of respondents who answered “yes” or qualified for the given category shown (number of respondents shown in parentheses) or mean/mean tolerance score shown. Tolerance scores were calculated based on responses to questions regarding respondents’ attitudes towards carnivores using a five-point Likert scale; responses ranged from “strongly dislike/approve” to “strongly like/disapprove” and mean tolerance/approval scores were obtained by assigning values ranging from -2 to +2 to this range of responses. Comparisons between new and repeat respondents were made via two-tailed Pearson’s χ^2 tests and *t*-tests.

Key demographic factor/attitude metric	New	Repeat	Test statistic	<i>p</i> -value	df	95% CI
DEMOGRAPHIC FACTOR						
Sex ratio (# males)	77 (60)	85 (111)	$\chi^2 = 3.600$	0.058	1.00	-0.265, -0.002
Farmer ratio (# farmers)	80 (62)	66 (86)	$\chi^2 = 1.840$	0.175	1.00	-0.037, 0.206
Average age (years)	43.6	44.7	$t = 0.442$	0.659	167.84	-3.624, 5.711
Average number of people/household	6	7	$t = 0.867$	0.387	151.26	-0.558, 1.432
ATTITUDE METRIC						
Believe number of livestock predation events are increasing	78 (61)	72 (93)	$\chi^2 = 0.807$	0.369	1.00	-0.064, 0.197
Believe coexistence with carnivores is possible	23 (18)	32 (41)	$\chi^2 = 1.327$	0.249	1.00	-0.218, 0.049
Believe management interventions increased tolerance of lions	45 (35)	52 (67)	$\chi^2 = 0.621$	0.431	1.00	-0.216, 0.083
Mean tolerance score toward lions	-0.218	-0.077	$t = -0.829$	0.408	151.6	-0.477, 0.195
Mean tolerance score toward lions close to village	-1.603	-1.357	$t = -1.777$	0.077	169.63	-0.519, 0.027
Mean tolerance score toward predators	-0.115	0.023	$t = -0.855$	0.394	142.88	-0.460, 0.182

Table S2: Relevant list of questions asked during initial (2014) and follow-up (2016) surveys. All questions were asked in both years unless otherwise noted.

Question

DEMOGRAPHICS

What is your gender?

Are you the head of your household?

How many people do you support?

How old were you on your last birthday?

What is the highest education level you have completed?

Do you own livestock? If so, how many of each species?

LIVESTOCK MANAGEMENT

Do you kraal your livestock at night? If so, what are the reasons? If not, why?

If you kraal your livestock, do you kraal them every night?

Do you pay a herder?

Do you have a child herd livestock?

If you have a herder, are they with livestock at all times?

Did you lose livestock to predators within the last year? If so, how many and what species?

2014 - Where do most attacks occur, in the kraal or in the veld?

2014 - How many attacks on livestock by predators are you willing to tolerate before killing culprits?

2016 - Did you lose livestock to predators within the last two years? If so, how many and what species?

WILDLIFE & CONSERVATION

Does wildlife benefit you?

Is there more wildlife now than ten years ago?

Do you or your family derive an income from wildlife?

Do you support the hunting ban in the area?

2014 - Do you think national parks are good or bad? Why?

2014 - Do national parks generate money for the government?

2014 - Do national parks take land away from people?

2014 - Do national parks take land away from livestock?

2014 - Do national parks take land away from hunting?

2014 - Do national parks protect wildlife for future generations?

2014 - Can Motswana collect firewood from national parks and game reserves?

2014 - Do national parks keep wildlife away from livestock?

2014 - What are the top three food choices for lions in the area?

HUMAN-CARNIVORE COEXISTENCE

How do you feel about lions: strongly like, like, neutral, dislike, or strongly dislike? Why?

How do you feel about lions being close to your village: strongly like, like, neutral, dislike, or strongly dislike? Why?

How do you feel about predators in general: strongly like, like, neutral, dislike, or strongly dislike? Why?

Do you think the number of predation events is increasing, decreasing or staying the same?

Is coexistence between farmers and predators possible?

What are ways to improve coexistence between farmers and predators?

What management techniques do you employ to reduce the chance of predation?

If you kill predators, what method do you use?

How many predators and what species have you killed in the last year?

How many predators and what species do you know of that have been killed by other villagers in the last year?

2014 - Are you willing to make changes to your livestock management if it will help minimize losses to predators?

2014 - If you are willing to make changes, what are you willing to change?

2016 - Do you perceive lions as a problem?

2016 - Do you perceive lions as a security threat?

HUMAN-CARNIVORE COEXISTENCE MANAGEMENT PROGRAMMES

2014 - How do you feel about the government's livestock compensation program: strongly like, like, neutral, dislike, or strongly dislike? Why?

2014 - If there was a separate insurance program that would compensate farmers for livestock lost to predators but required you to kraal your livestock every night, hire a herder to stay with livestock at all times, and stop killing predators, would you be interested in participating?

2014 - Would you be willing to pay to participate in this separate livestock insurance program? If yes, how much per year?

2016 - If you lost livestock in the last two years, did you notify the lion conservation program?

2016 - If you lost livestock in the last two years, did you notify DWNP?

2016 - If you lost livestock in the last two years, did you apply for compensation through DWNP? If so have you been compensated?

2016 - Do you know how many lions our program has collared in the area? How many?

2016 - Do you know the given local names of these lions? If so, list the ones you know.

2016 - Have you seen the programme constructed kraals?

2016 - What are your thoughts on the programme constructed kraals? Please share good and bad opinions.

2016 - Have you received any lion alerts? If so, how?

2016 - Do lion alerts benefit you? If yes, how would you like to receive lion alerts in the future?

2016 - If you have received a lion alert, what is your response to these alerts?

2016 - Have the conservation program's activities increased your tolerance of lions in the area?

2016 - Have you made any changes to your livestock management methods since the start of the conservation program?

Table S3: Initial survey (n=201) respondent demographic information by village and location (VC: village center and CP: cattle post).

Village: No. respondents	Avg. age	Gender pct. M / sex ratio M:F	Pct. top schooling level reached None / 1° / 2° / 3°	Avg. no. people in household	Pct. livestock owners
Beetsha: 47					
VC: 23	42	87 / 20:3	30 / 22 / 35 / 9	6	69
CP: 24	40	91 / 22:2	33 / 25 / 25 / 17	9	75
Eretsha: 50					
VC: 25	32	40 / 10:5	32 / 24 / 44 / 0	6	48
CP: 25	48	56 / 14:1	76 / 6 / 16 / 0	6	100
Gudigwa: 49					
VC: 26	43	62 / 16:10	46 / 12 / 38 / 4	8	65
CP: 23	46	91 / 21:2	57 / 13 / 30 / 0	9	70
Gunotsoga: 55					
VC: 26	35	46 / 12:14	15 / 12 / 69 / 4	7	46
CP: 29	41	83 / 24:5	55 / 10 / 34 / 0	7	97
TOTAL: 201	40	69 / 139:62	43 / 15 / 37 / 4	7	71
VC: 100	38	58 / 58:42	31 / 17 / 47 / 4	7	56
CP: 101	43	80 / 81:20	55 / 14 / 27 / 4	8	86

Table S4: Follow-up survey (n=208) respondent demographic information by village and location (VC: village center and CP: cattle post).

Village: No. respondents	Avg. age	Gender pct. M / sex ratio M:F	Pct. top schooling level reached None / 1° / 2° / 3°	Avg. no. people in household	Pct. livestock owners
Beetsha: 48					
VC: 27	46	78 / 21:6	26 / 44 / 30 / 0	7	85
CP: 21	45	86 / 18:3	29 / 24 / 48 / 0	7	90
Eretsha: 51					
VC: 25	37	44 / 11:14	32 / 36 / 32 / 0	6	64
CP: 26	51	65 / 17:9	54 / 23 / 19 / 0	7	89
Gudigwa: 53					
VC: 33	43	85 / 28:5	30 / 30 / 39 / 0	7	67
CP: 20	53	100 / 20:0	50 / 20 / 30 / 0	7	95
Gunotsoga: 56					
VC: 26	34	42 / 11:15	8 / 15 / 69 / 8	6	77
CP: 30	49	73 / 22:8	63 / 13 / 23 / 0	6	97
TOTAL: 208	46	71 / 148:60	37 / 26 / 36 / 1	7	82
VC: 111	40	64 / 71:40	24 / 32 / 42 / 2	7	73
CP: 97	50	79 / 77:20	52 / 20 / 29 / 0	7	93

Table S5: Number of livestock that respondents owned and reported were killed by carnivores in the year before the initial 2014 survey and in the two year span of the project through 2016 follow-up surveys. Follow-up data included which carnivores were reported responsible for lost livestock. The percentage of livestock lost to a given predator is shown with number of livestock lost shown in parentheses. There were 143 livestock owners in 2014 and 171 in 2016.

Livestock	2014			2016							
	Owned	Killed	Pct.	Owned	Killed	Pct.	Lion	Spotted Hyena	African Wild Dog	Leopard	Unknown
Cattle	2,941	346	11.8	2,540	145	5.7	75 (108)	8 (12)	6 (9)	0 (0)	11 (16)
Goat	551	22	4.9	745	29	3.9	76 (22)	3 (1)	7 (2)	14 (4)	0 (0)
Donkey	91	2	2.2	73	2	2.7	50 (1)	50 (1)	0 (0)	0 (0)	0 (0)
Horse	28	1	3.6	25	3	12	100 (3)	0 (0)	0 (0)	0 (0)	0 (0)
TOTAL	3,611	371	10.3	3,383	179	5.3	76 (134)	8 (14)	6 (11)	2 (4)	9 (16)

Table S6: Government valuation in USD (BWP) of livestock respondents reported lost to predators in one year before initial surveys in 2014 and over the course of the two year study as reported in follow-up surveys in 2016 from focal villages (Gunotsoga, Eretsha, Beetsha, and Gudigwa) in the human-lion conflict study area in northern Botswana.

Livestock Lost	Value USD (BWP)	2014		2016	
		No. Lost	Total Value USD (BWP)	No. Lost	Total Value USD (BWP)
Bovids					
Cow	300 (3,000)	268	80,400 (804,000)	102	30,600 (306,000)
Calf	100 (1,000)	39	3900 (39,000)	6	600 (6,000)
Bull	550 (5,500)	N/A	N/A	11	6,050 (60,500)
Ox	300 (3,000)	39	11,700 (117,000)	27	8,100 (81,000)
Goat	45 (450)	22	990 (9,900)	30	1,350 (13,500)
Subtotal		368	96,990 (969,900)	176	46,700 (467,000)
Equids					
Horse	250 (2,500)	1	250 (2,500)	3	750 (7,500)
Donkey	20 (200)	2	40 (400)	2	40 (400)
Subtotal		3	290 (2,900)	5	790 (7,900)
TOTAL		371	97,280 (972,800)	181	47,490 (474,900)