

# An analysis of Human Wildlife Conflict in the Torra Conservancy for the period 2007 to 2010

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for CDSS

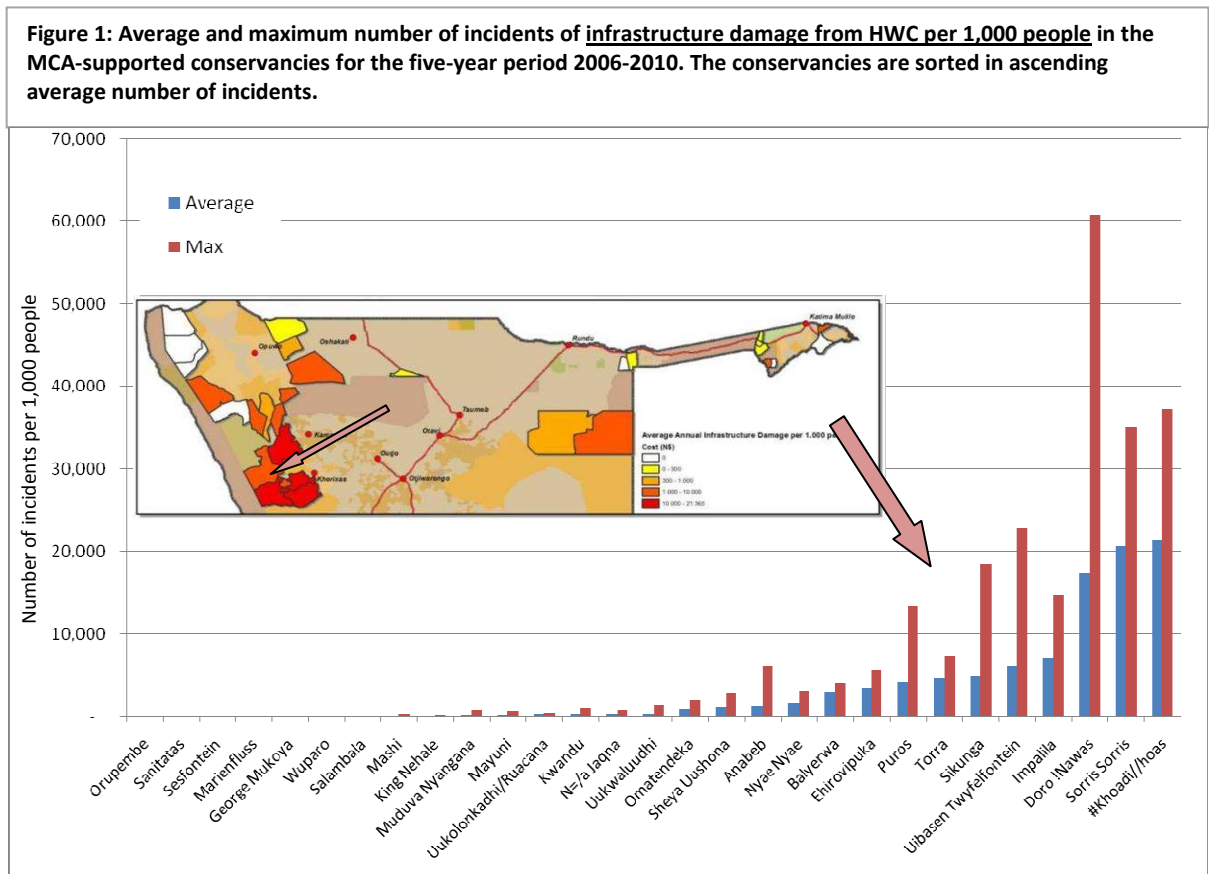


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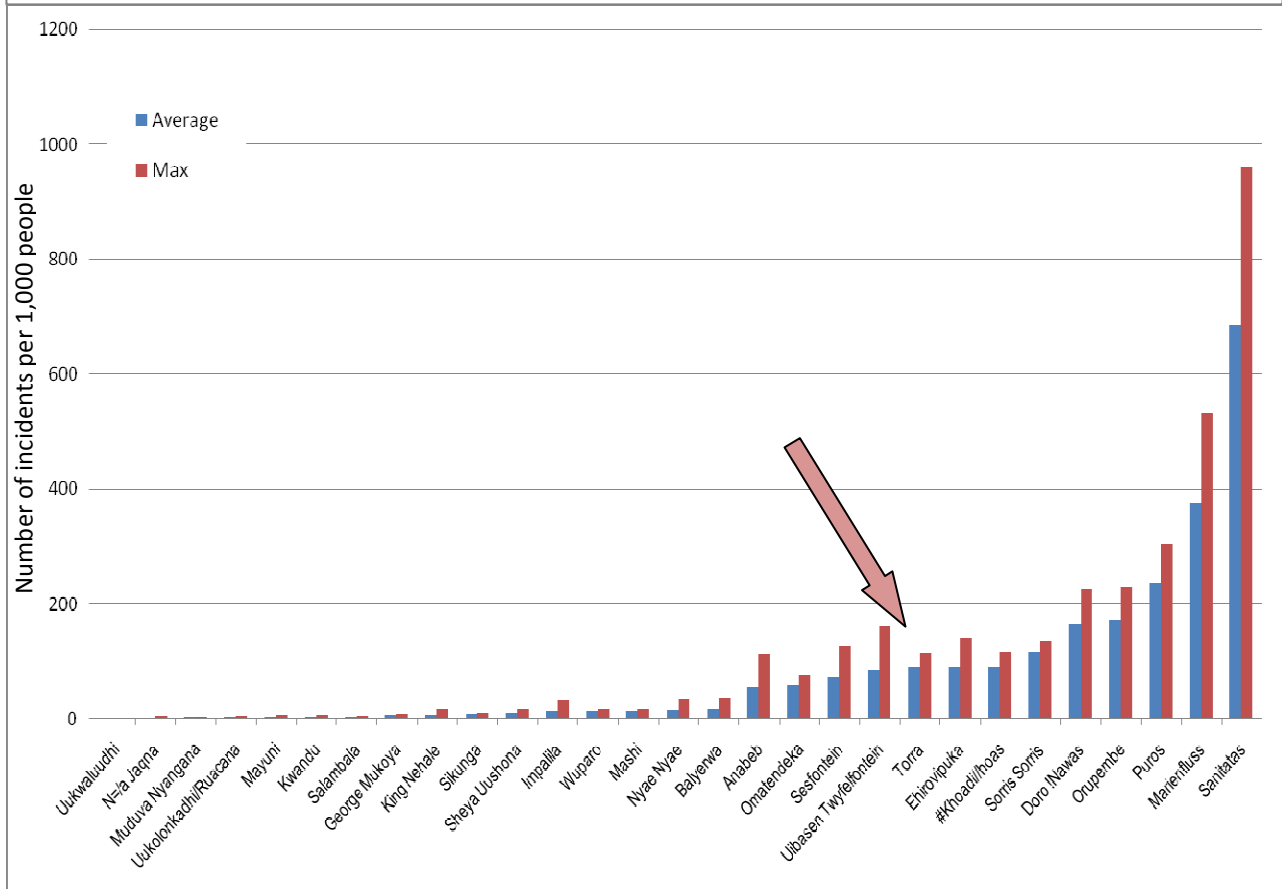
## Introduction

1. This analysis was undertaken to:
  - a. Better understand the extent, characteristics and details of Human-Wildlife Conflict (HWC) in the Torra Conservancy; and
  - b. Plan an appropriate response to HWC at the conservancy level, taking into account the various types of conflict, the costs of the different types of conflict, the wildlife species involved, the geographic locations of the conflict and the dynamic nature of the conflict in terms of seasonality, year to year and longer-term trends.
2. The Torra Conservancy was assessed because of its exposure to above average levels of HWC (Table 1), particularly from elephant damage to water and other infrastructure (Figure 1) but also from predation on domestic livestock (Figure 2).

Average HWC cost (N\$) per member per year	Conservancy
> 1,000	Sanitatas
500 - 1,000	Marienfluss
250 - 500	Orupembe
100 - 250	Puros, Doro !Nawas, Ehrovipuka, Sorris Sorris, Sesfontein
50- 100	#Khoadi//hoas, Omatendeka, Uibasen Twyfelfontein, <b>Torra</b> , Balyerwa, Impalila, Kwandu, Mashu
25 - 50	Anabeb, Wuparo, Mayuni
10 - 25	Nyae Nyae, Sikunga, Sheya Uushona, Salambala, George Mukoya, King Nehale
< 10	Muduva Nyangana, Uukolonkadhi/Ruacana, N=/a Jaqna, Uukwaluudhi



**Figure 2: Average and maximum number of incidents of livestock losses from HWC per 1,000 people in the MCA-supported conservancies for the five-year period 2006-2010. The conservancies are sorted in ascending average number of incidents.**



- The **Vision** of the Torra Conservancy as stated in their HWC Management Plan is “To live in harmony with wildlife by reducing human-wildlife conflict as much as possible and optimizing sustainable benefits”.

The following **Objectives** were developed to help ensure that the Vision is achieved:

- To generate sustainable income from elephants through tourism and thereby help enhance harmony between farmers and elephants;
- To reduce losses to farmers from hyaenas, lions and cheetahs, increase benefits & monitor movements of these species; and
- To manage populations of jackal and caracal and thereby reduce conflicts, and to increase benefits through management and a self reliance scheme.

- The data used in this analysis were obtained from the Event Books of the Community Game Guards in the Torra Conservancy. The analysis covers the period from January 2007 to December 2010.
- An important principle of the Event Book system is that the Event Books live in the conservancy and are used for local decision-making and adaptive management. They may never leave the conservancy. For this reason, the relevant pages of the Event Books were photographed in the conservancy office and the data were then transcribed into an excel spreadsheet.

## Results and Discussion

6. The HWC data for the Torra Conservancy are presented in Appendix 1 and summarized in Table 2 below. These data were analysed in three ways:

- (i) number of incidents of (a) infrastructure damage (mainly water related, but also fencing, gardens and homesteads), and (b) predation, per species and per year;
- (ii) cost of incidents from both infrastructure damage and predation, per species and per year; and
- (iii) geographic distribution of incidents.

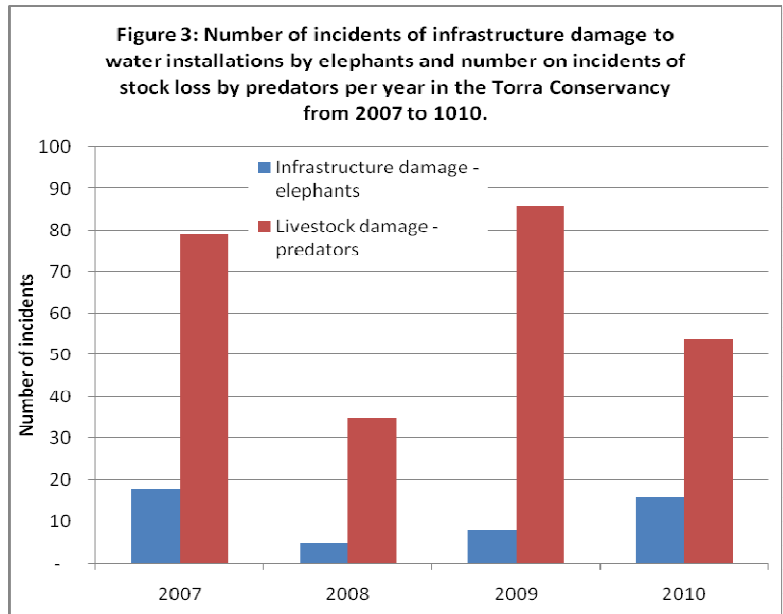
Total HWC incidents and costs over four years	No. / Value	Average HWC incidents and costs per year	No. / Value
Total number of infrastructure incidents	47	Average no. of infrastructure incidents	11.75
Total cost (N\$) of infrastructure incidents	<b>N\$74,900</b>	Average cost (N\$) of infrastructure incidents	<b>N\$18,725</b>
Total number of all predation incidents	254	Average no. of all predation incidents	63.5
Total number of livestock lost	485	Average no. of livestock lost	121.25
Total cost (N\$) of livestock lost	<b>N\$449,500</b>	Average cost (N\$) of livestock lost	<b>N\$112,375</b>
<b>Total costs (N\$) of all HWC over 4 years</b>	<b>N\$524,400</b>	<b>Average cost (N\$) of all HWC per year</b>	<b>N\$131,100</b>

7. Costs of infrastructure damage were based on average replacement costs and cost to people's livelihoods, while predation costs were based on the current average value of livestock in the region. These costs are summarized in Table 3.

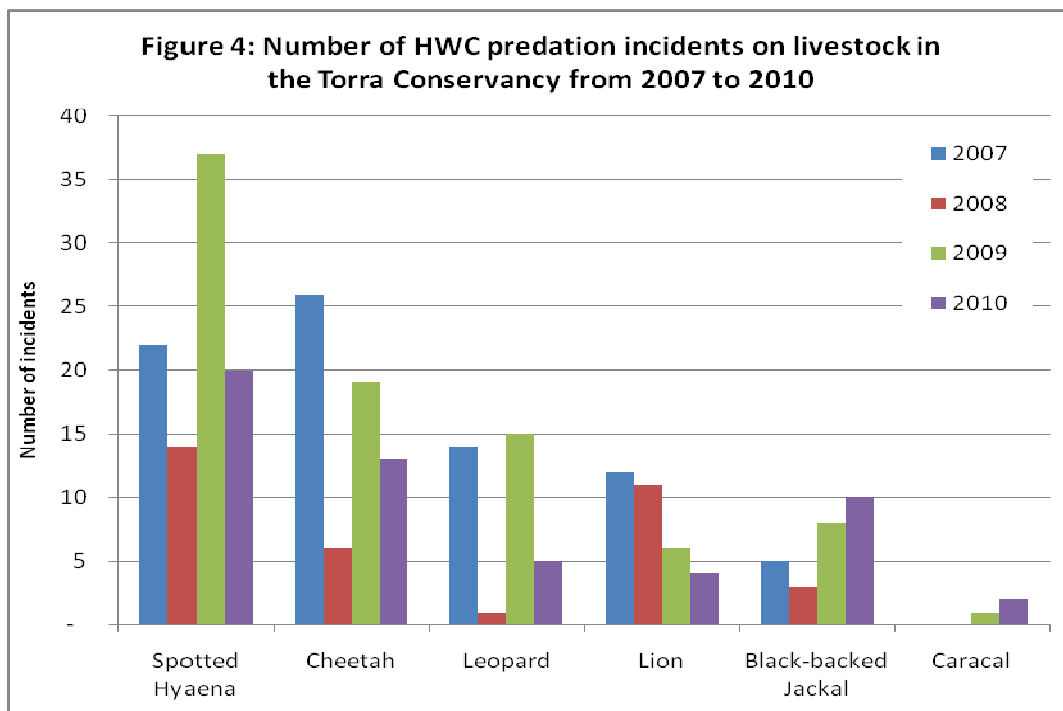
HWC Impact		Cost (N\$)	Explanatory notes on cost
Human life		5,000	This is <b>not</b> a value on human life but only the cost of funeral benefits provided.
Infrastructure damage	Pipes	1,500	Per incident, being the estimated average cost of new infrastructure / equipment, transport, travel and installation.
	Taps	1,500	Per incident, being the estimated average cost of equipment, transport, travel and installation.
	Tank	4,000	For 5,000 litre tank. Includes purchase, transport and installation.
	Pump	40,000	Includes Lister diesel engine, pump, transport and installation.
	Windmill	90,000	Includes purchase, transport and installation.
	Actual water loss	150	Per tank of 5,000 litres, calculated at pumping rate of 2,000 litres water per hour, 6 litres diesel per hour at N\$10 per litre.
	Cost to livelihood as a result of losing water	6,100	Per 30 days of impact on livestock condition and reproduction, assuming a 5% value loss to stock over this period; and assuming an average livestock holding of 40 goats, 10 sheep, 5 cows and 4 donkeys per household; with an average of 4 households per water point.
	Fence	350	Per incident, being the estimated average for replacement of material, transport and repair time.
	Garden	500	Per incident, being an estimate of average value of vegetables lost and opportunity costs including travel and health impacts.
Homestead	3,500	Per incident, being an estimate of average cost of replacement of material and rebuilding time and labour.	
Local value of domestic stock	Cow	4,000	Cost of replacing lost livestock
	Horse	1,500	
	Goat	600	
	Donkey	500	
	Sheep	450	

8. The average annual cost of HWC to farmers in the Torra Conservancy is about N\$131,000 per year. Over the four years of this analysis it ranged from N\$96,000 in 2008 to N\$169,000 in 2007. About 86% of the costs of HWC resulted from livestock losses from predation, while the remaining 14% resulted from elephants damaging infrastructure – mainly water installations.

9. There is considerable year-to-year variation in the number of incidents of HWC (Figure 3). In 2007, for example, the number of incidents of infrastructure damage was more than three times greater than in 2008. Similarly, in 2009 the number of incidents of livestock predation was almost 2.5 times greater than in the preceding year.

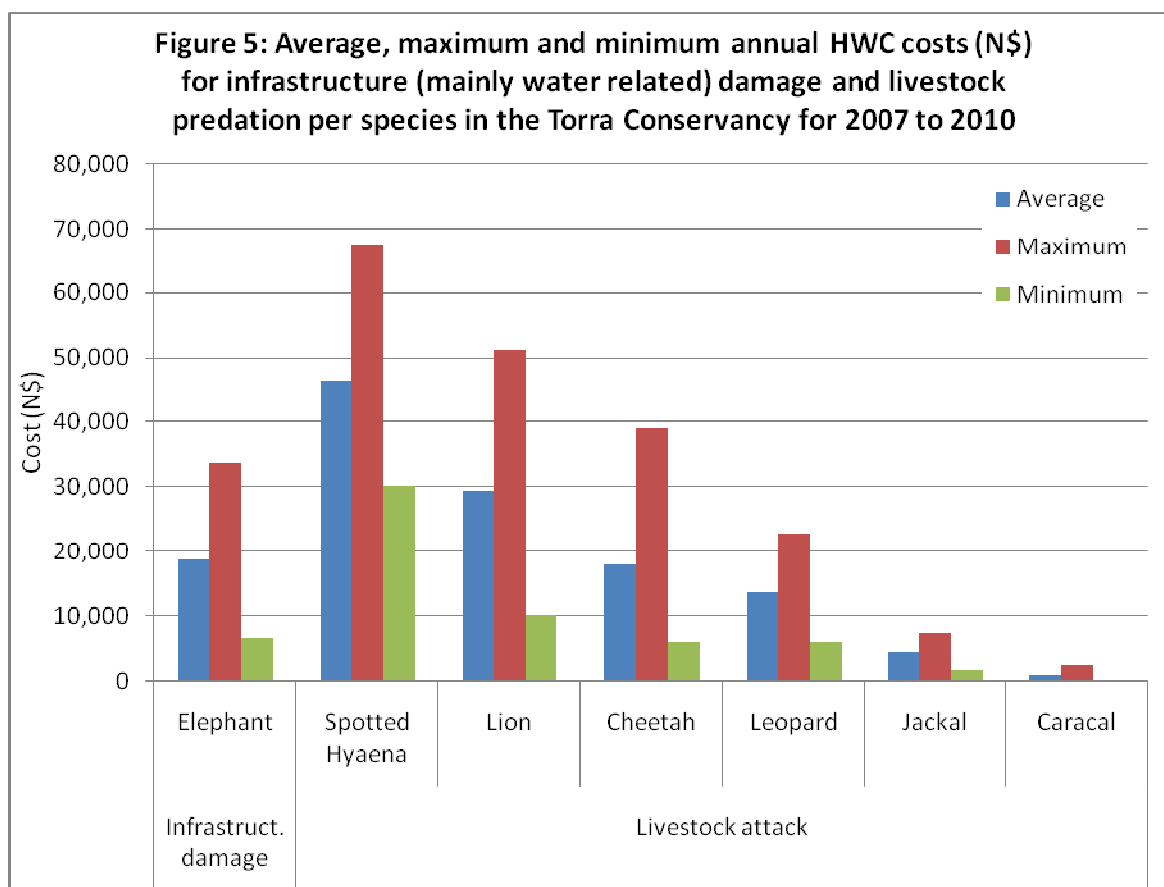


10. There is also considerable year-to-year variation in the levels of predation within each species (Figure 4). During the four-year period, Spotted Hyaena were responsible for the highest number of incidents (average of 23 per year) followed by Cheetah (16/yr), Leopard (9/yr) and Lion (8/yr). Jackal accounted for only 6.5 incidents on average per year, in marked contrast to the situation in other southern Kunene conservancies, where Jackal are much more prominent in causing HWC.



11. The average annual cost of HWC for the four years of 2007 and 2010 are shown in Figure 5. The greatest annual average cost of HWC was caused by Spotted Hyaena followed by Lion, Elephant, Cheetah and

Leopard. The minimum and maximum cost of HWC caused by each species varies widely. This illustrates the highly unpredictable nature of HWC. Mean figures tell only part of the story: in some years farmers face more than twice the mean cost of HWC from some species (e.g. Cheetah).



12. An “incident” of livestock predation often involved the killing of more than one animal. In total there were 254 livestock incidents in the Torra Conservancy over the four years resulting in a loss of 485 head of livestock, i.e. 1.9 animals per incident (Table 4). The average highest loss per incident was for goats. Where more than one larger animal (e.g. cow, donkey) was killed in one incident, it was often calves or foals.

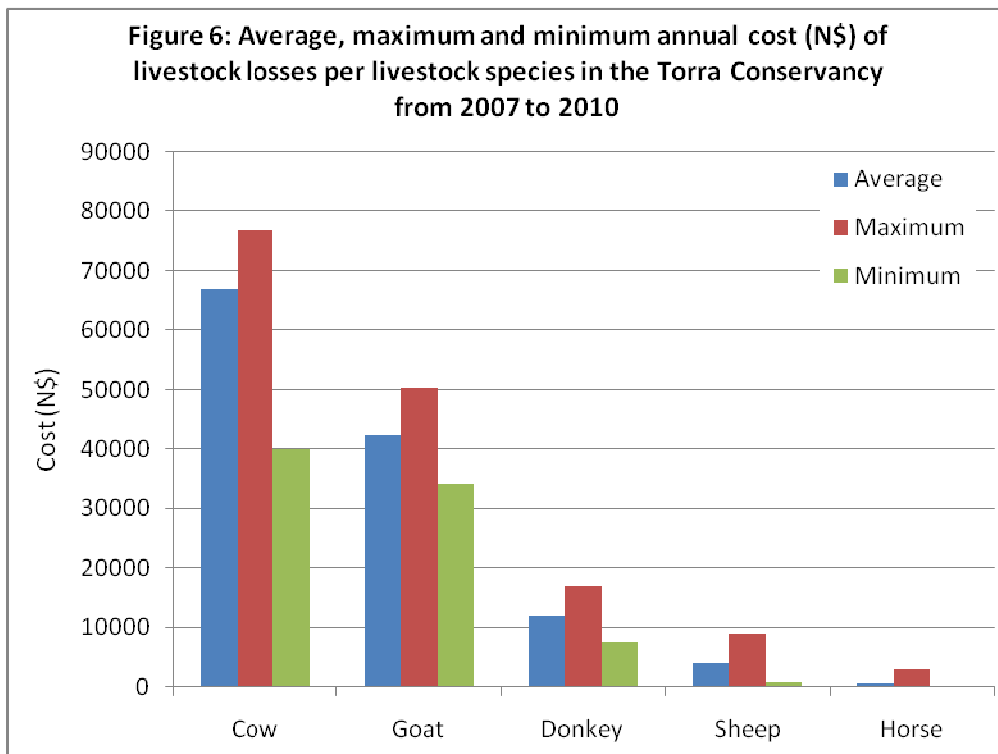
Stock	No. incidents	No. stock lost	Average no. stock per incident
Cow	40	67	1.7
Donkey	62	97	1.6
Goat	129	283	2.2
Horse	1	2	2.0
Sheep	22	36	1.6
<b>Total</b>	<b>254</b>	<b>485</b>	<b>1.9</b>

13. The ratio in incidents to livestock losses also varied between predators (Table 5). Lion caused the most damage per incident followed by Leopard and Cheetah.

Predator	No. incidents	No. stock lost	Average no. stock per incident
Caracal	3	5	1.7
Cheetah	64	124	1.9
Hyaena	93	159	1.7
Jackal	26	30	1.2
Leopard	35	72	2.1
Lion	33	95	2.9
<b>Total</b>	<b>254</b>	<b>485</b>	<b>1.9</b>

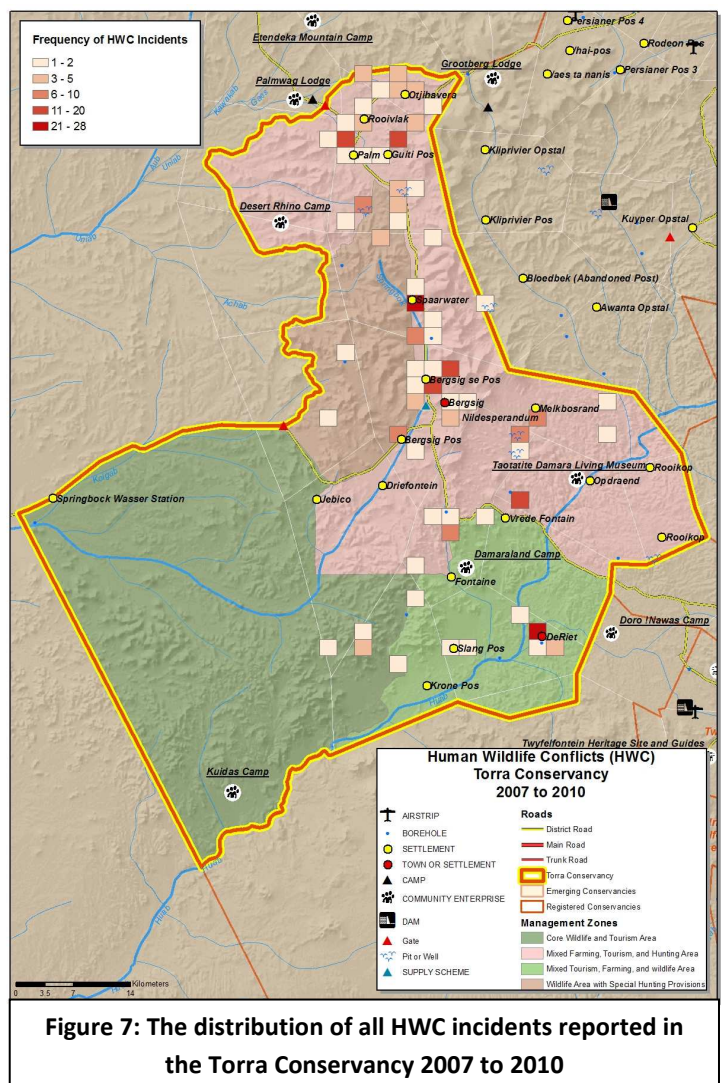
14. The greatest annual average stock loss in terms of cost (Figure 6) was that experienced by farmers from predation on cows (on N\$67,000 per year), followed by goats (N\$42,000 per year). The total lost per year on average from all predation was just over N\$131,000.





15. The distribution and relative frequency of all HWC incidents in Torra over the four-year period of 2007 to 2010 are mapped in Figure 7. This shows that the incidents are not distributed evenly across the conservancy. Rather, they are associated with large river systems, mountainous and broken terrain, and neighbouring areas zoned for wildlife, e.g. the Palmwag concession area and the wildlife zones of adjacent conservancies.

16. These HWC incidents are broken out by species responsible for the conflict (Figure 8a & b). The maps show that particular farming areas in the conservancy carry a far greater burden of HWC incidents than others. Conflict with Elephants, for example, occurs mainly to the north and east of the conservancy, associated with Elephant movements from Etosha, Hobatere and #Khoadi Hôas Conservancy via the larger ephemeral river systems. Lion conflicts occur mainly in the northern part of Torra, adjacent to the Palmwag and Etendeka concession areas and the wildlife zone around the Klip River in the



**Figure 7: The distribution of all HWC incidents reported in the Torra Conservancy 2007 to 2010**



≠Khoadi Hôas Conservancy. The incidents of Spotted Hyaena and Cheetah livestock predation are more widespread.

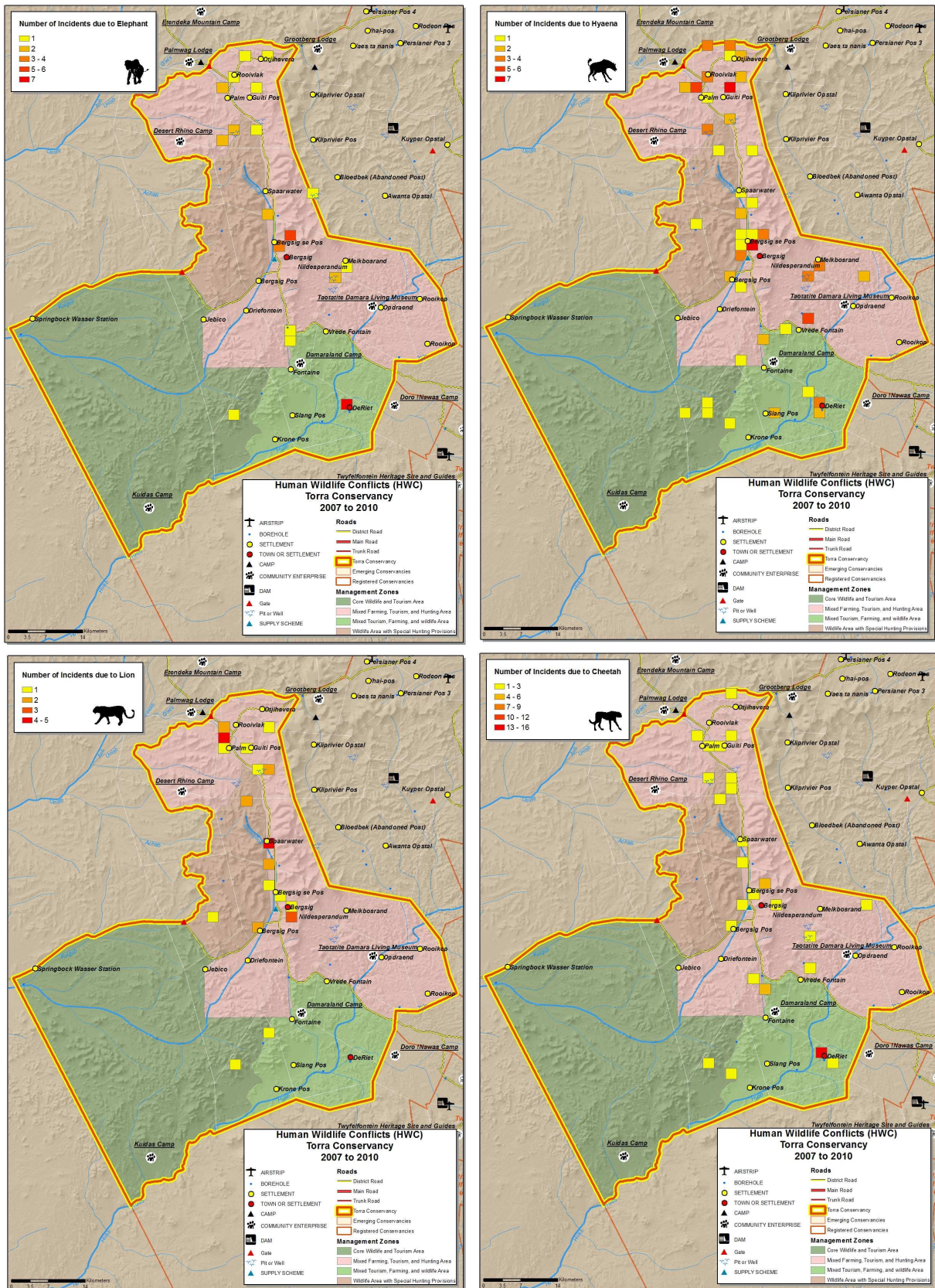


Figure 8a: Distribution and relative occurrence of HWC incidents for specific species causing conflicts. Starting top left and clockwise: Elephant, Spotted Hyaena, Cheetah and Lion.



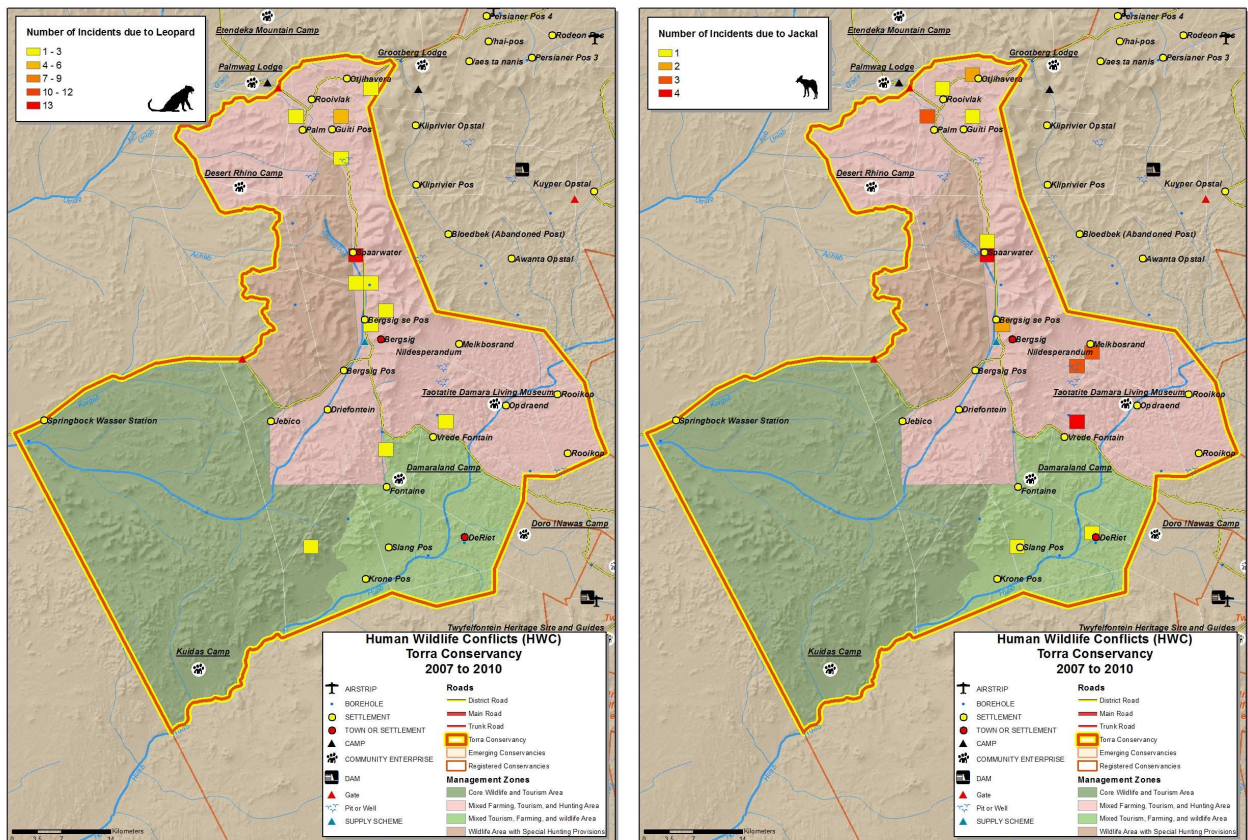


Figure 8b: Distribution and relative occurrence of HWC incidents for Leopard (left) and Black-backed Jackal (right)

17. While the average cost of HWC per member of the Torra Conservancy may seem fairly modest, at about N\$65 per year, this masks the very high costs to farmers in particular areas. At De Riet the average annual loss was just over N\$7,000 with the highest loss in one year of almost N\$16,000. In the Bergsig, Spaarwater and Palm farming areas the average annual losses were N\$48,950, N\$64,900 and N\$78,000 respectively. The highest losses for the last two (Spaarwater and Palm) in one year were N\$34,150 and N\$38,900 respectively. These are very significant losses.

18. By focusing projects aimed at reducing HWC costs at the key conflict sites, very significant reductions can be made to the high costs faced by a relatively small number of individual farmers in the Torra Conservancy.

## Conclusion and Recommendations

19. The following general observations emerge from this analysis:

- The impact of HWC on farmers is highly variable from year to year.
- Not all farmers share the costs of HWC equally. Farmers on elephant migration routes and near their favoured feeding grounds carry a greater burden of infrastructure damage and water loss than do other farmers.
- The predators responsible for the greatest livestock losses are Spotted Hyaena, Lion and Cheetah. Again, the distribution of incidents is not uniform and farmers near the Palmwag and Etendeka concession areas, and the core wildlife areas of adjacent conservancies (e.g. the Klip River area) are at greater risk than farmers further south.

- d) While the annual average cost of HWC to conservancy members is about N\$65 the costs to farmers in some areas is vastly larger. For example, the farmers in the Spaarwater and Palm areas faced losses of N\$34,000 and N\$39,000 in some years. These farmers carry the burden of HWC for the conservancy. Their costs from HWC are currently considerably greater than the benefits that they receive.
- e) Finding solutions to help reduce the incidents of HWC is therefore extremely important from a financial point of view, and specifically from a poverty and livelihoods perspective.
- f) However, there is also an important intangible component. Farmers manage the land, the water points and are in frequent daily contact with the conservancy's wildlife. It is important for farmers to have a positive attitude towards wildlife and to be actively supporting the conservancy. The large financial losses being experienced by farmers in this conservancy pose a serious risk of farmers turning against the conservancy.
- g) It is clear that decisive interventions are required to address both infrastructure damage caused mainly by elephants, and particularly domestic stock losses caused mainly by predators. Different project interventions are needed for these two categories.
- h) In the case of elephants, the main interventions are (a) the protection of key water points used for homesteads and domestic stock in priority conflict areas (e.g. Bergsig, Bergsig pos and De Riet) and (b) the provision of alternative waters for elephants in nearby carefully selected places.
- i) It is also likely that different interventions will be needed to deal with different types of predation. Currently the three main predators that account for about 83% of the cost of livestock losses to all predators are Spotted Hyaena, Lion and Cheetah. The first two of these are largely nocturnal predators, while the Cheetah hunts mainly during the day and seldom attacks animals when kraaled at night. To mitigate livestock loss to the nocturnal predators requires that domestic stock is kraaled at night in strong, secure kraals. This will necessitate both a change in management practices and the development of appropriate kraal infrastructure together with targeted training. The most useful approach for diurnal predators is to intensify protection of stock during the day, such as is provided by the use of livestock guard dogs. This would require the development of a livestock guard dog programme and supportive training and back-stopping. Clearly, the protection of stock from these three species is a priority for the Torra Conservancy. By protecting livestock against these species, the measures taken will also provide protection against other species such as Leopard, Jackal, Caracal and Baboons.
- j) It is important that these interventions are piloted with a number of willing farmers who suffer the greatest losses. The pilot interventions must be carefully monitored, adapted as necessary and then rolled out to other farmers suffering significant HWC losses.

## **Acknowledgement**

The conservancy game guards collect and document all the HWC incidents in their Event Books. These are in turn checked by conservancy managers and audited annually by NACSO's Natural Resources Working Group. Without the team of people who developed and fine-tuned the Event Book system, provided the training and back-stopping, provide ongoing support to conservancies in the regions, collect, check, analyse and curate the data, this report would not have been possible. I would take this opportunity to acknowledge the fine ground-breaking work done by the whole team, from community game guards to support organisations to technical support staff. I thank Jo Tagg for discussions on the strategic approach to HWC analysis and management, and Sylvia Thompson for developing the maps.

**Appendix 1: Summary of Human Wildlife Conflict per species and per types of incident in the Conservancy from January 2007 to December 2010 (data from Game Guard Event Books)**

Species	Types of HWC incident		2007			2008			2009			2010		
			N.o.I	Stock loss	Cost (N\$)	N.o.I	Stock loss	Cost (N\$)	N.o.I	Stock loss	Cost (N\$)	N.o.I	Stock loss	Cost (N\$)
Elephant	Infrastructure	Pipes	5		7,500	4		6,000	7		10,500	5		7,500
		Taps	-		-	-		-	1		1,500	-		-
		Tank	1		4,000	-		-	-		-	3		12,000
		Water loss	1		150	-		-	-		-	3		450
		Livelihood	1		6,100	-		-	-		-	2		12,200
		Garden	10		5,000	1		500	-		-	3		1,500
<b>Subtotal Elephant</b>			<b>18</b>		<b>22,750</b>	<b>5</b>		<b>6,500</b>	<b>8</b>		<b>12,000</b>	<b>16</b>		<b>33,650</b>
Caracal	Live-stock	Goat	-	-	-	-	-	-	-	-	-	2	4	2,400
		Sheep	-	-	-	-	-	-	1	1	450	-	-	-
<b>Subtotal Caracal</b>			<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>450</b>	<b>2</b>	<b>4</b>	<b>2,400</b>
Cheetah	Live-stock	Goat	22	56	33,600	5	9	5,400	16	27	16,200	12	14	8,400
		Sheep	4	12	5,400	1	1	450	3	3	1,350	1	2	900
<b>Subtotal Cheetah</b>			<b>26</b>	<b>68</b>	<b>39,000</b>	<b>6</b>	<b>10</b>	<b>5,850</b>	<b>19</b>	<b>30</b>	<b>17,550</b>	<b>13</b>	<b>16</b>	<b>9,300</b>
Hyaena	Livestock	Goat	1	2	1,200	4	13	7,800	7	28	16,800	7	8	4,800
		Sheep	1	1	450	-	-	-	2	3	1,350	-	-	-
		Cow	4	5	20,000	6	8	32,000	9	9	36,000	5	23	36,000
		Donkey	16	17	8,500	4	4	2,000	19	27	13,500	8	11	5,500
<b>Subtotal Hyaena</b>			<b>22</b>	<b>25</b>	<b>30,150</b>	<b>14</b>	<b>25</b>	<b>41,800</b>	<b>37</b>	<b>67</b>	<b>67,650</b>	<b>20</b>	<b>42</b>	<b>46,300</b>
Jackal	Live-stock	Goat	4	4	2,400	1	1	600	8	10	6,000	10	12	7,200
		Sheep	1	1	450	2	2	900	-	-	-	-	-	-
<b>Subtotal Jackal</b>			<b>5</b>	<b>5</b>	<b>2,850</b>	<b>3</b>	<b>3</b>	<b>1,500</b>	<b>8</b>	<b>10</b>	<b>6,000</b>	<b>10</b>	<b>12</b>	<b>7,200</b>

Leopard	Human attack		-			-		1			-			
	Livestock	Goat	8	20	12,000	1	1	600	11	19	11,400	5	19	11,400
		Sheep	4	6	2,700	-	-	-	1	1	450	-	-	-
		Cow	2	2	8,000	-	-	-	1	1	4,000	-	-	-
		Donkey	-	-	-	-	-	-	1	1	500	-	-	-
		Horse	-	-	-	-	-	-	1	2	3,000	-	-	-
Subtotal Leopard			14	28	22,700	1	1	600	15	24	19,350	5	19	11,400
Lion	Livestock	Goat	1	2	1,200	4	34	20,400	-	-	-	-	-	-
		Sheep	-	-	-	-	-	-	1	3	1,350	-	-	-
		Cow	7	12	48,000	1	2	8,000	3	3	12,000	2	2	8,000
		Donkey	4	4	2,000	6	23	11,500	2	6	3,000	2	4	2,000
Subtotal Lion			12	18	51,200	11	59	39,900	6	12	16,350	4	6	10,000
Subtotal Infrastructure Damage			18		22,750	5		6,500	8		12,000	16		33,650
Subtotal Livestock Losses			79	144	145,900	35	98	89,650	86	144	127,350	54	99	86,600
Subtotal Human Attack			-			-			1			-		
TOTAL HWC			97	144	168,650	40	98	96,150	95	144	139,350	70	99	120,250