



# **Bovine Tuberculosis (BTB) Surveys and Statistics**

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# Introduction

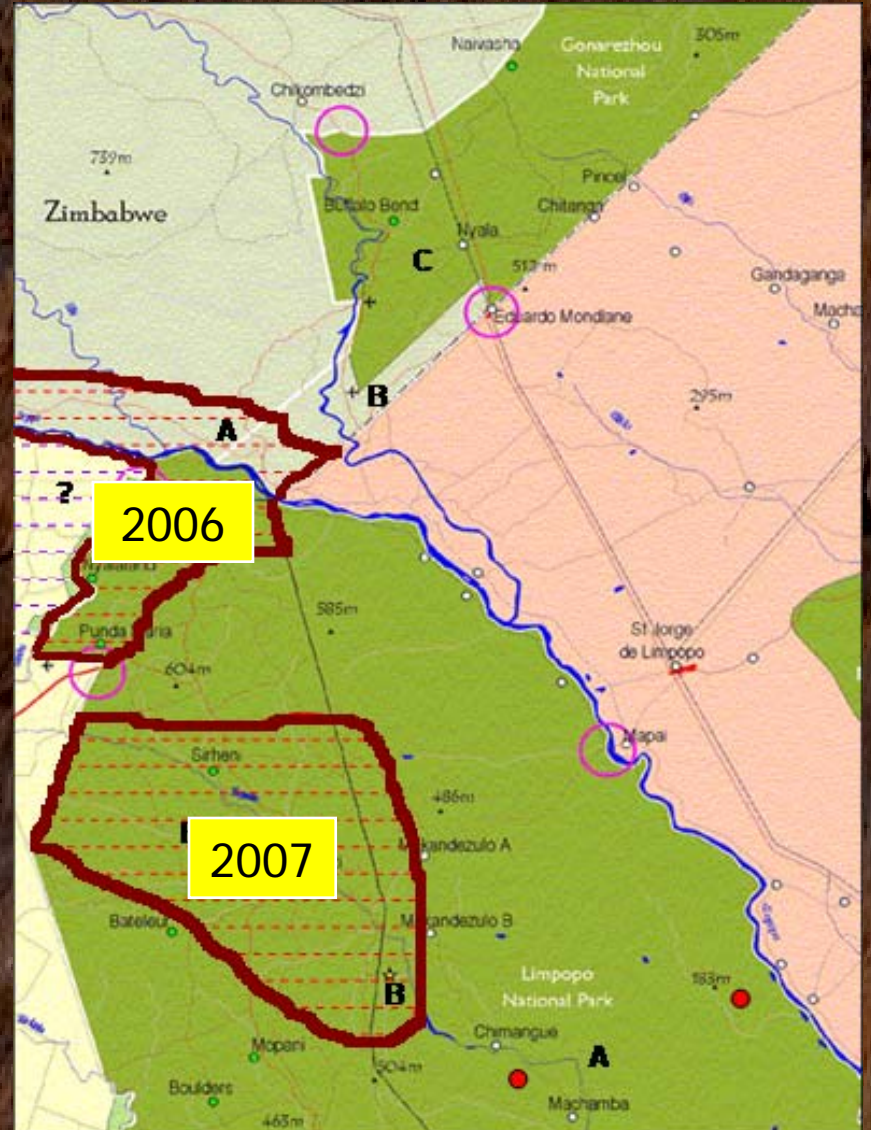
2005

- Young buffalo bull with advanced bovine tuberculosis was found in the Luvuvhu River, 8km from the northern boundary of KNP
- The disease had spread through the length of the Park
- Implications for the Transfrontier Conservation areas of the GLTFCA in both Zimbabwe and Mozambique



# Objectives

- 2006
  - Determine BTB prevalence in buffalo population of the Limpopo River catchment (non-lethal sampling)
- 2007
  - Determine BTB prevalence in the buffalo population of the Shingwedzi River catchment (non-lethal sampling)



**Table 1. Surveys for BTB in Buffalo, KNP - Timeline**

1990	Index case for BTB – buffalo bull south western boundary (Bengis et al, 1996)
1990	57 animals culled from two herds adjacent to index case – herd prevalence - 15.8% (lethal sampling) (Bengis et al, 1996)
1991/ 1992	2071 animals culled as part of population management – 20 to 30 animals selected from each herd. Virtually all the herds south of the Sabie River positive for BTB - herd prevalence 2% to 67% (De Vos et al, 2001)
1993	Culling of buffalo terminated due to dramatic reduction in population due to drought (De Vos et al, 2001)
1996	67 buffalo culled from three herds north of the Olifants River (lethal sampling) – two herds positive (De Vos et al, 2001)
1998	1991/92 prevalence rates retrospectively estimated to 0%, 4.4% and 27.% in the north, central and south zones, respectively (Rodwell et al, 2001)
1998	Introduced the idea of zonal prevalence – south (south of Sabie River), central (Sabie River to Olifants River) and north (north of Olifants River) zones. Minimum sample size selected to provide precise prevalence estimates (Lethal survey). Prevalence estimated at 1.5%, 16% and 38.2% in the north, central and south zones, respectively (Rodewell et al, 2001)

2000	608 adult buffalo from 29 herds north of the Olifants River test for BTB using gamma-interferon test (non-lethal sampling). Test positive animals found in two additional herd north of the Olifants River and a single herd north of the Shingwedzi River. Sample size only allowed disease detection at prevalence rates of 10% to 15% (95% confidence level) (Grobler et al, 2002)
2005	206 buffalo sampled south of the Sabie River (lethal sampling). 20 animals selected from 10 herds. Prevalence was estimated at 30.3%



# Prevalence Estimation

- Delineated the zones using the watershed between river systems rather than the rivers themselves
- Determine zonal and not herd prevalence
- Stratify for age and sex
- Sample the least number of animals to give a prevalence estimate at 5% accuracy

# Non-lethal sampling

- Selected buffalo are immobilized, bled, individually marked and then revived and released on site
- The blood samples are tested for BTB using the gamma-interferon assay
- Test positive animals are then relocated, euthanased and necropsied
- Lethal sampling – all animals to be sampled are culled



# Non-lethal sampling



- Non-lethal sampling was selected as it;
  - Limits the number of animals culled, especially when the expected prevalence is low
  - Reduces the ecological impact through the removal of a limited number of animals

# TPC's

- 2005, a number of TPC's were developed for BTB in the buffalo population
- A primary objective of conducting the BTB prevalence surveys in 2006/7 was to validate and determine if the thresholds for the following TPC's have been reached or exceeded.
  - **i) Increase in spatial distribution of BTB into the adjacent Transfrontier Conservation Areas**
  - **ii) Increased or sustained zonal prevalence of BTB in buffalo to above 40% in any zone**

# Results

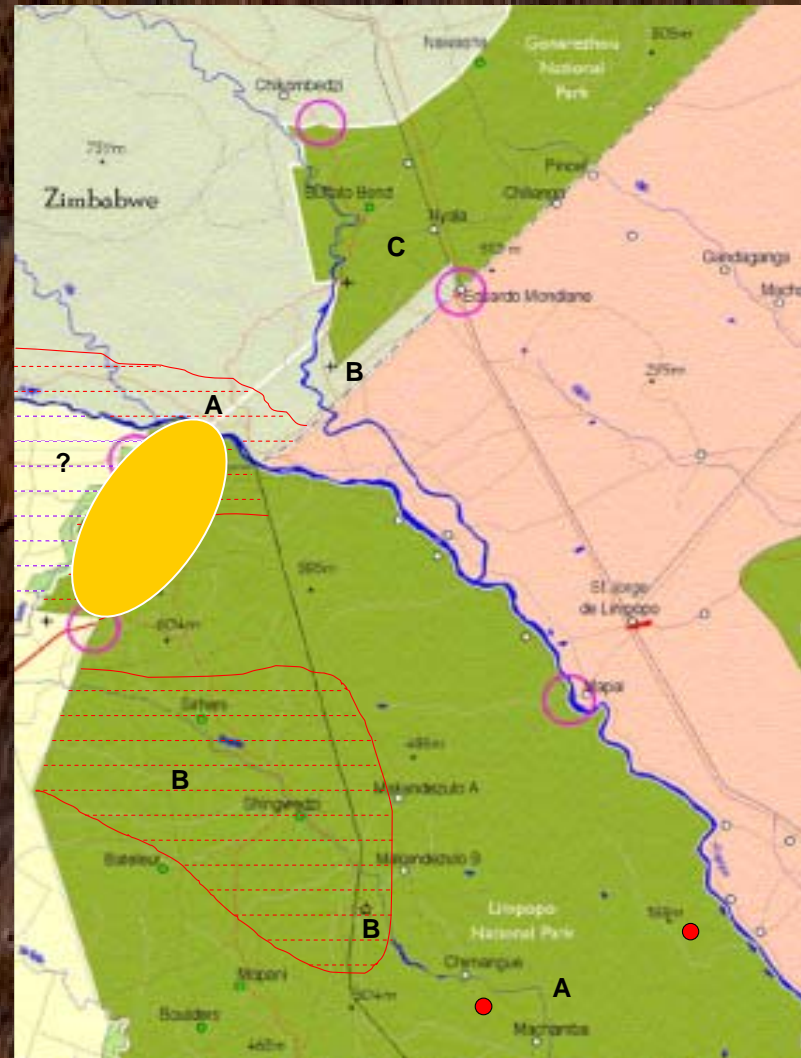
- Limpopo River Catchment
- Due to logistical constraints it was not possible to conduct the survey in the Zimbabwean portion of the catchment

BTB Survey 2006 Limpopo River Catchment					
Date	Herd name and ID	Approx. Herd size	Total No. Sampled	Male	Female
14/7/2006	Punda airstrip	150	18	6	12
14/7/2006	Masakosa	100	15	8	7
15/7/2006	Maseya sandveld	190	23	7	16
16/7/2006	Crooks Corner	80	9	3	6
16/7/2006	Thulamela	70	8	3	5
16/7/2006	Makuleke safaris	60	7	3	4
17/7/2006	Nwambi block	70	9	4	5
17/7/2006	Nwaneba windmill	60	4	1	3
18/7/2006	Makwadsi	100	12	4	8
18/7/2006	Makwadsi	70	10	6	4
18/7/2006	Ecotrail camp	40	2	1	1
19/7/2006	Dzundwini	150	16	9	7
		<b>1140</b>	<b>133</b>	<b>55</b>	<b>78</b>

Gamma test positive
6 yr Male
4 yr Female
2 yr Male
<b>3</b>

# Results

- Limpopo River Catchment
- Limpopo River Catchment Zonal Prevalence 1.00 to 4.20% (95% Confidence interval), Mean = 1.9%



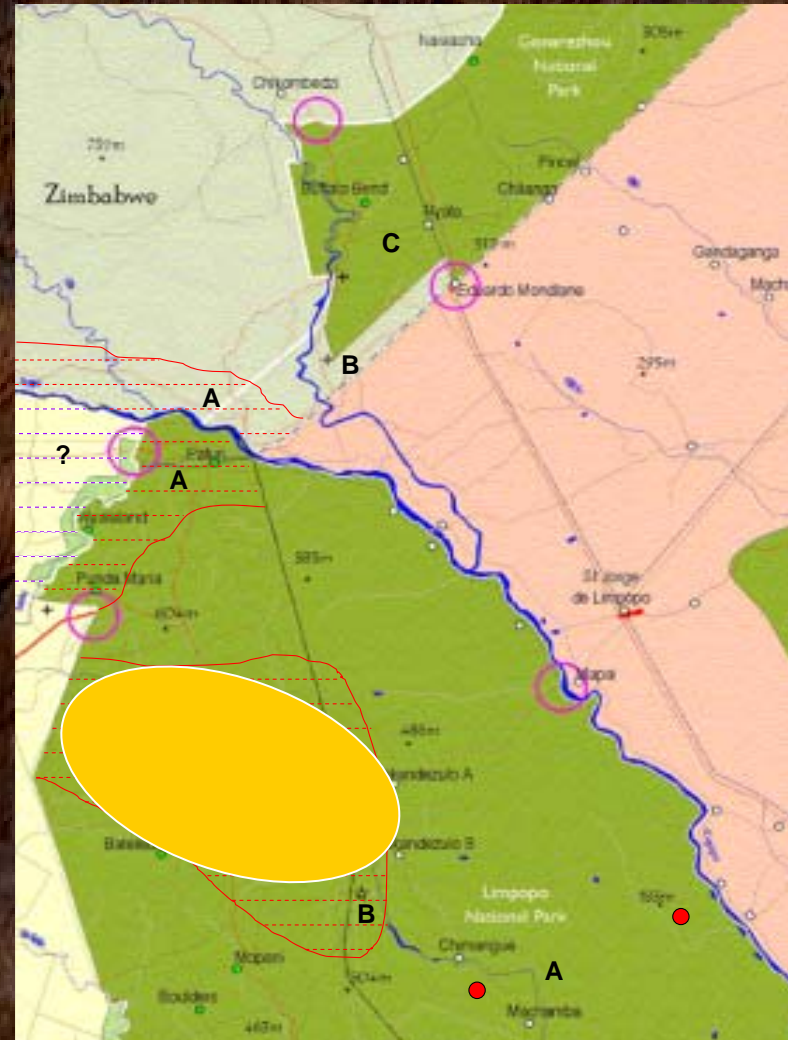
# Results

## ■ Shingwedzi River Catchment

BTB survey 2007 Shingwedzi River Catchment						Gamma test positive
Date	Herd name & ID	Approx. Herd size	Total no. sampled	Male	Female	
16/07/07	Dzombo	700	48	13	35	3 yr female
17/07/07	Bububu	250	18	8	10	7 – 8 yr female
19/07/07	Shingomeni	400	28	13	15	4.5 yr male
19/07/07	Langtoon dam	400	23	10	13	10 yr female
19/07/07	Gaza airstrip, Mozambique	70	5	1	4	8 yr female
20/07/07	Nyunyani (Shitangeni herd)	170	13	5	8	2 yr female
23/07/07	Boyela	400	29	7	22	6 yr female
24/07/07	Malahlapanga	200	14	5	9	9 yr male
24/07/07	Mpongolo	400	28	7	21	8 yr female
25/07/07	Boomplaas (Zari)	250	14	3	11	3 yr female
25/07/07	25/07/07	130	9	2	7	
		1730	229	74	155	10

# Results

- Shingwedzi River Catchment
  - Zonal Prevalence 1.72% to 7.01% (95% confidence interval), Mean = 4.37%

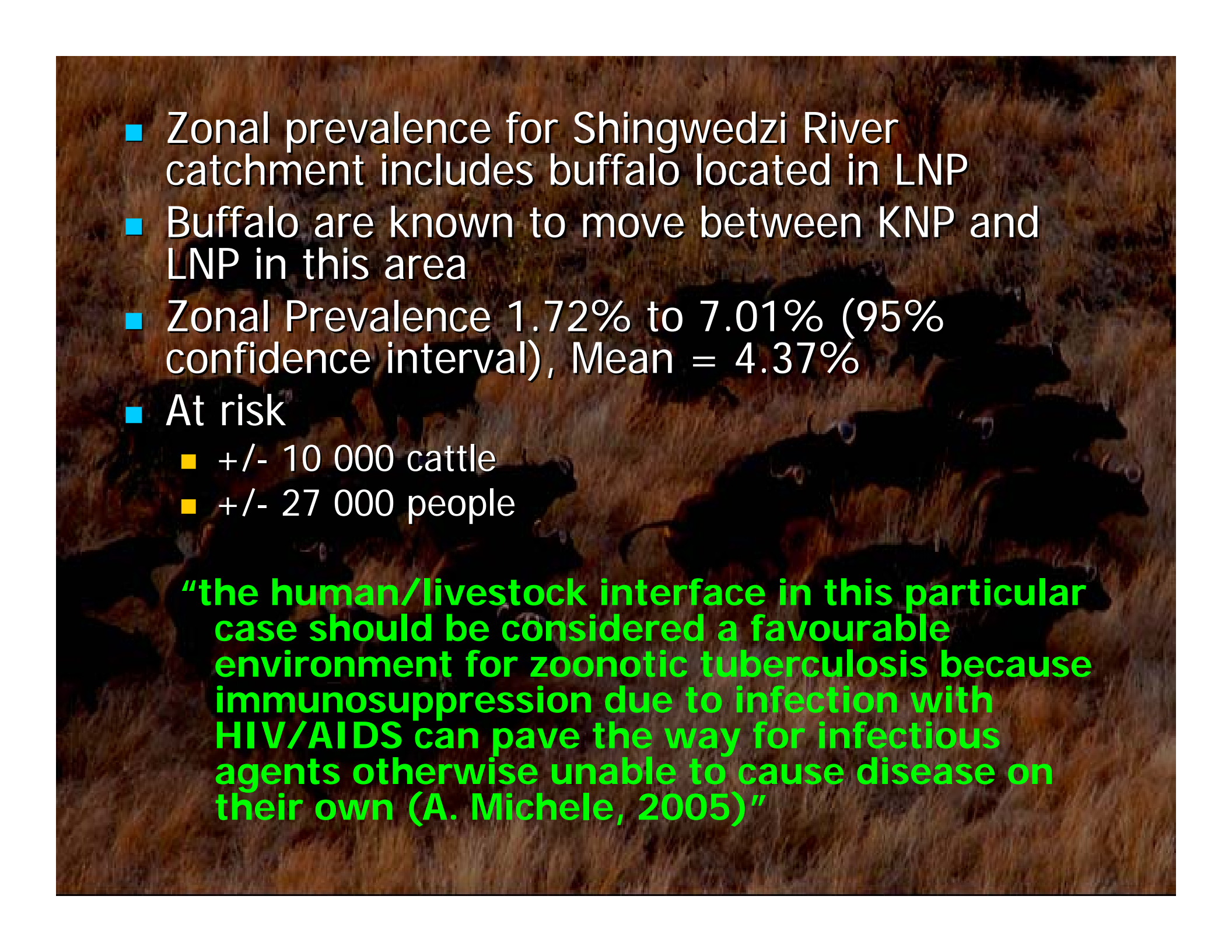


# Discussion

- Results confirm that BTB had reached the most northern areas of KNP
- Increased disease prevalence = increased chance of disease transmission
  - Domestic stock
  - Humans
- At risk are the communities and their domestic stock bordering the KNP
- KNP is a potential exporter of BTB to it's neighbours?

- Buffalo are reported to cross the Limpopo River into Zimbabwe on a regular basis – prevalence is 1.9% (range 1.00 to 4.2%)



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- A photograph of a herd of buffalo grazing in a field of dry, brown grass. The buffalo are dark in color and are scattered across the frame, some facing the camera and others with their backs to it. The background is a dense field of similar grass, extending to the horizon.
- Zonal prevalence for Shingwedzi River catchment includes buffalo located in LNP
  - Buffalo are known to move between KNP and LNP in this area
  - Zonal Prevalence 1.72% to 7.01% (95% confidence interval), Mean = 4.37%
  - At risk
    - +/- 10 000 cattle
    - +/- 27 000 people

**“the human/livestock interface in this particular case should be considered a favourable environment for zoonotic tuberculosis because immunosuppression due to infection with HIV/AIDS can pave the way for infectious agents otherwise unable to cause disease on their own (A. Michele, 2005)”**



# Risk to conservation of biodiversity

- Risk to spillover species?
- Risk to buffalo?

## Buffalo (Biodiversity TPC)

A decline in zonal population growth rate to below 5% (normal growth rate 8% to 12%) in three consecutive years during a wet cycle, in a total buffalo population of less than 30 000 animals

**Wet cycle – a mean annual rainfall for three consecutive years, including the year under consideration, above the long-term annual mean**

# Acknowledgements

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