

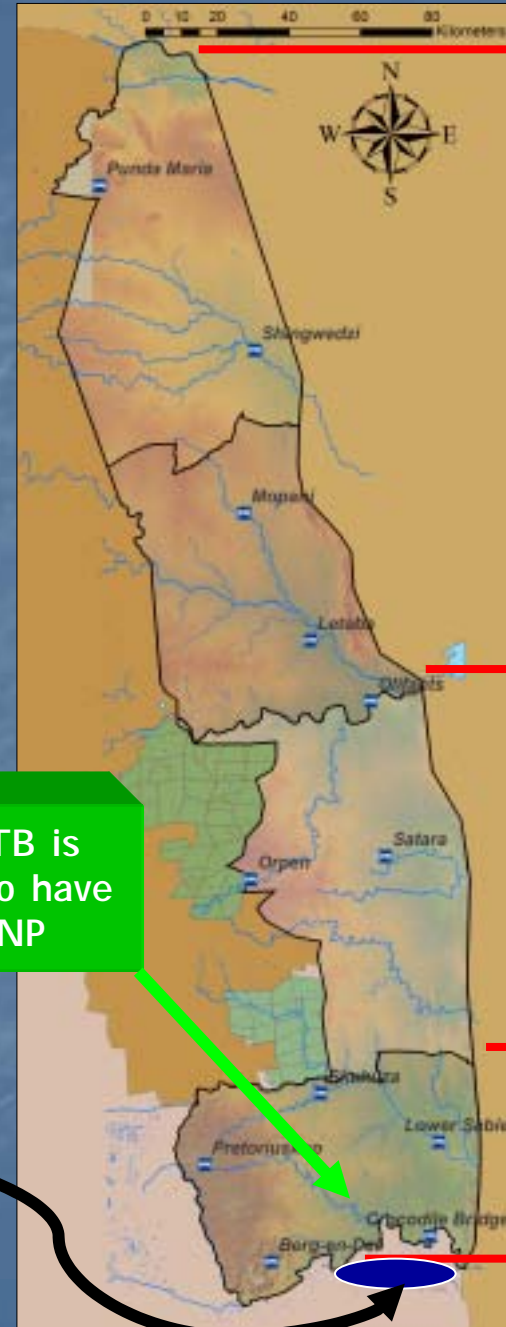
Current Thinking Regarding the Distribution and impact of Bovine Tuberculosis on Buffalo Populations

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1950's Cattle in commercial farms south of the Crocodile river were heavily infected with Bovine Tuberculosis (BTP)

Buffalo crossed the river into these farms and *visa versa*. Records of *Theileriosis*.

+ 1960 BTB is believed to have entered KNP



Northern Zone

Central Zone

Southern Zone

2005 BTB approximately 6 km from northern boundary

2002 BTB approximately 12km north of Shingwedzi

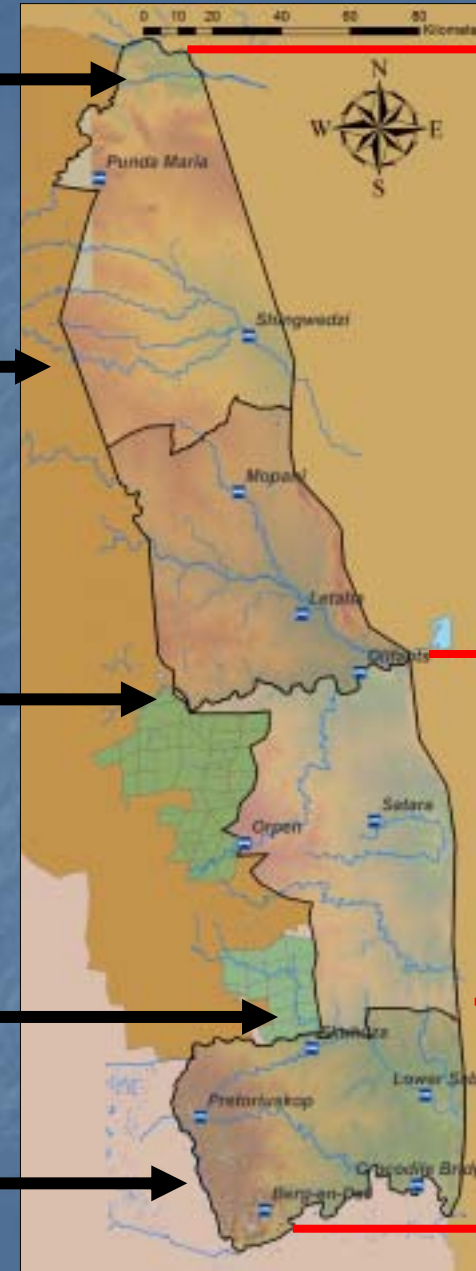
1999 First infected cow found along the Shingwedzi river

1998 Lethal Survey - Prevalence rates
Southern Zone - 38.2%
Central Zone - 16.0%
Northern Zone - 1.5% (estimated)

1996 First two infected herds found north of the Olifants river

1991-1992 Lethal Surveys indicated most herds south of the Sabie river were infected. Prevalence 27.1 %

1990 First case of BTB diagnosed in a sub-adult male buffalo

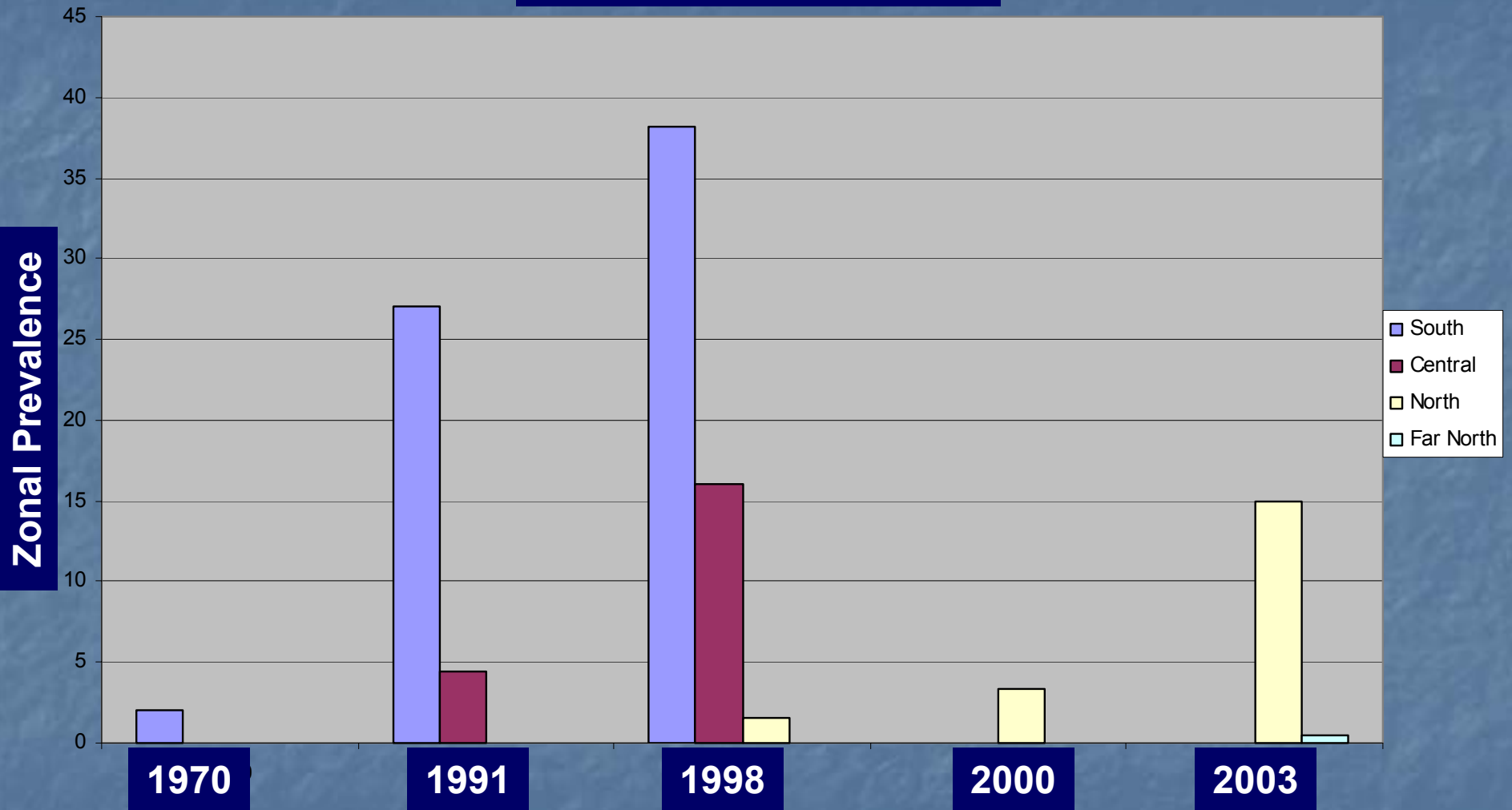


Northern Zone

Central Zone

Southern Zone

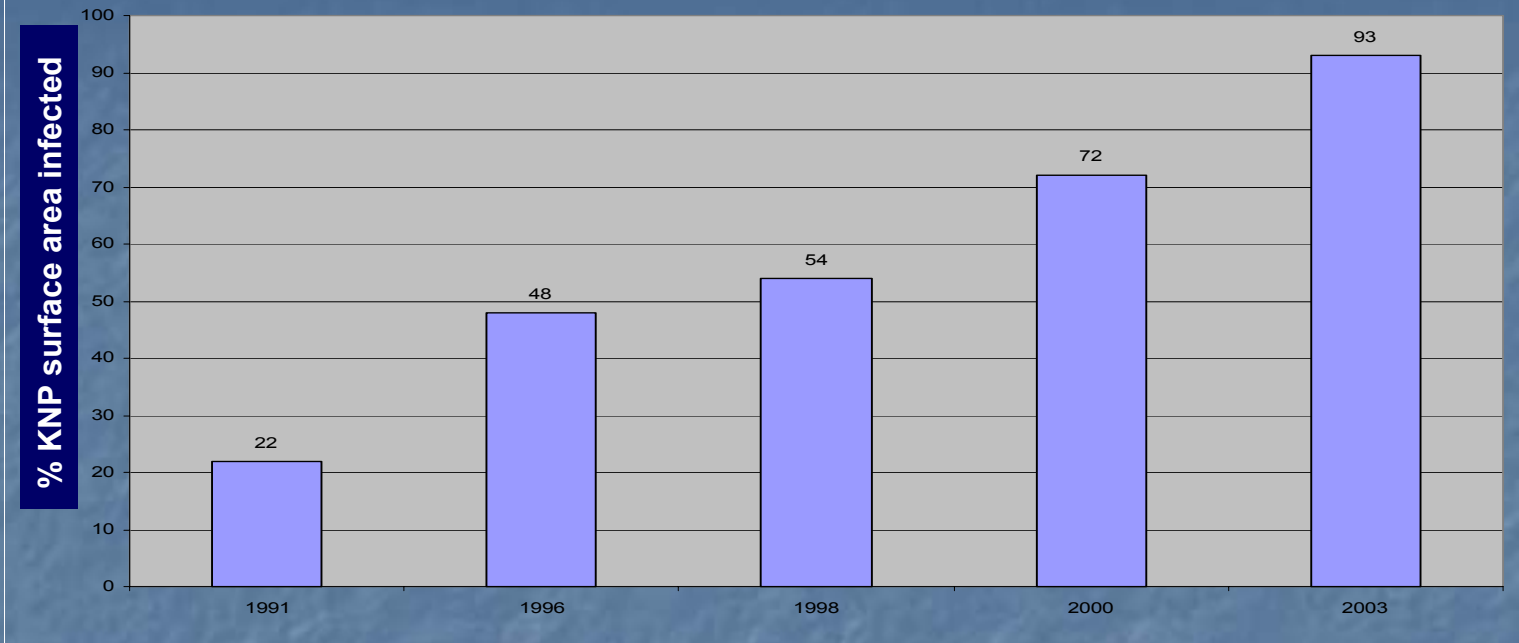
Spatial / Temporal Trends Bovine TB in KNP



- In August 2005 a buffalo positive for TB was autopsied 6 km from northern border
- Implications for the formation of Transfrontier Conservation area
- Reaching of a TPC threshold
- Non-lethal survey planned for 2006 in the northern zone, focusing on herds along borders



Bovine TB – Temporal / Spatial Spread

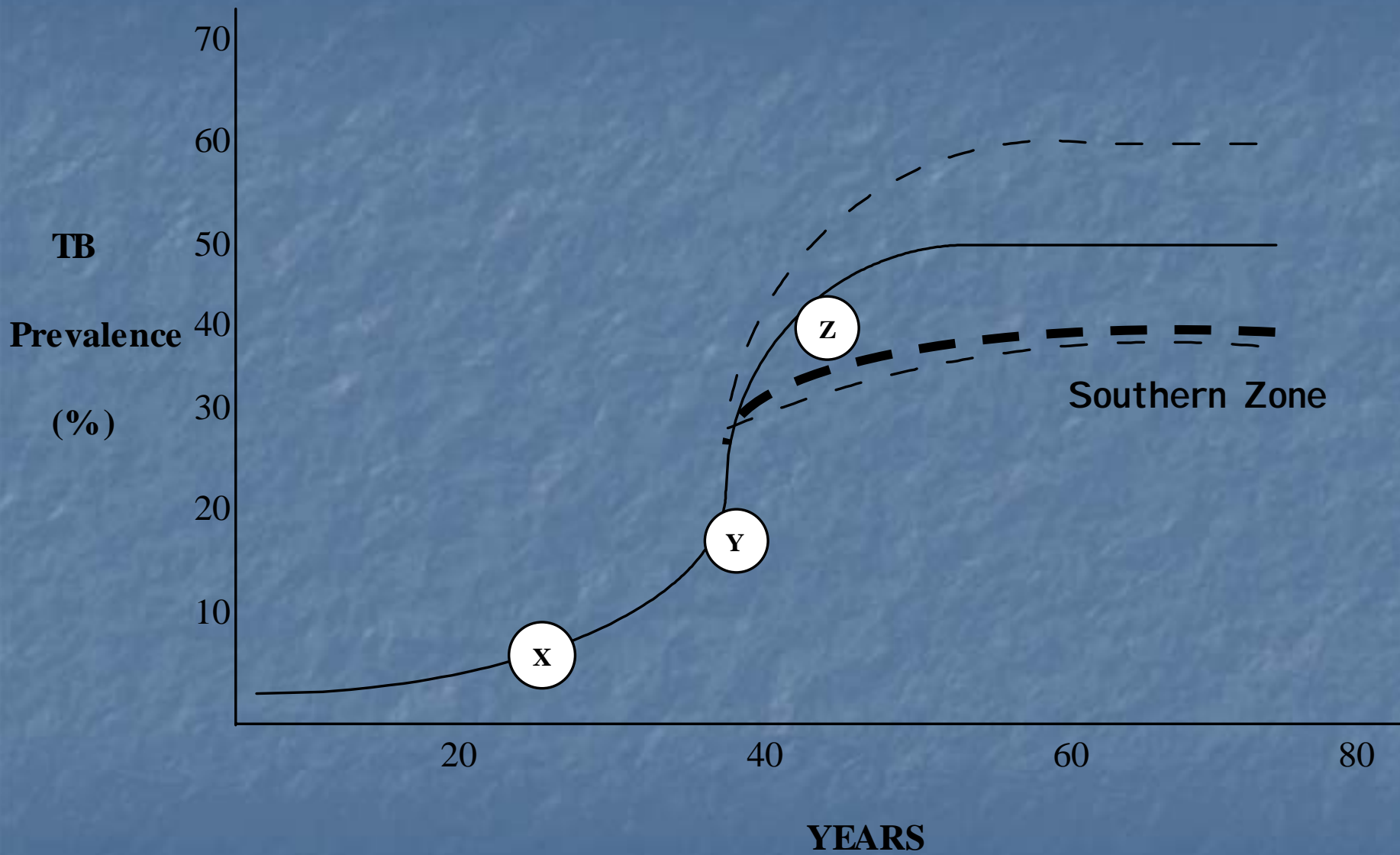


- As the incidence of BTB has progressively increased from south to north, so has the prevalence
- Zonal prevalence has risen due to increases in both the average herd prevalence and the number of herds infected
- Buffalo herds in an estimated 95% of the surface of the KNP are infected with BTB

2005 Lethal survey

- Conducted in buffalo herds south of the Sabie River to determine zonal (southern) prevalence
- Macroscopic pathology indicated a prevalence of 32%
- Culture results not known, but previous results predict an increase of 4.8%
- Zonal prevalence \pm 36.8%
- Prevalence in 1990/1 was 27.1% and 38.2% in 1998



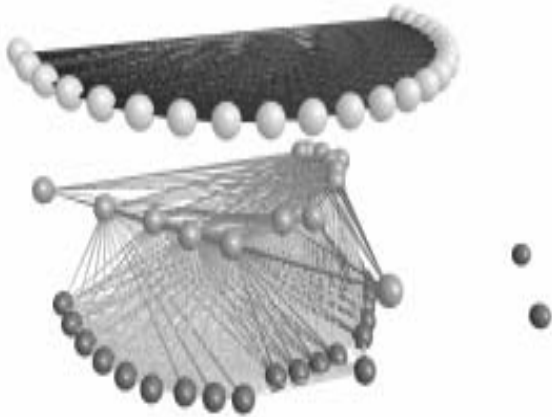


Results from 1998 Survey

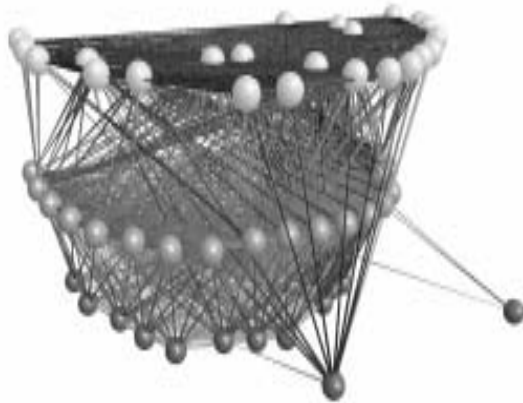
ZONE	NUMBER OF ANIMALS SAMPLED	ZONAL PREVALENCE	% BUFFALO ≥ 9 YEARS OLD	BUFFALO ≤ 2 YEARS OLD - % INFECTED
SOUTH	206	38.5%	5.3%	30.3%
CENTRAL	206	19.7%	5.8%	17.2%
NORTH	206	1.5%	15%	0.0%

- Earlier reports suggest that BTB mortality primarily affects adults – they are exposed to the disease longer
- However, it has been noted that as zonal prevalence increases, so the number of calves and yearlings infected
- 2005 survey, 19.7% (13/66) of animals with macroscopic lesions were less than 2 years old

May 2002



Nov. 2001 – Nov. 2003



Believed

- Buffalo herds were relatively stable
- Bachelor males move between herds, but rarely females or younger animals

Research

- KNP – buffalo herds exist in a fission-fusion society
- Bulls disperse over 120 km
- Herds move over 40 km

* Paul Cross, 2004

Actual

Estimated



- Estimated that BTB was spreading northwards at 6 km / year

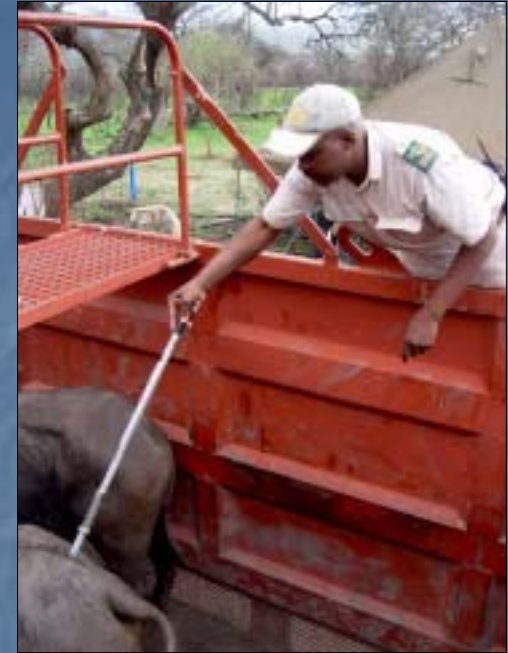
(De Vos et al, 2001)



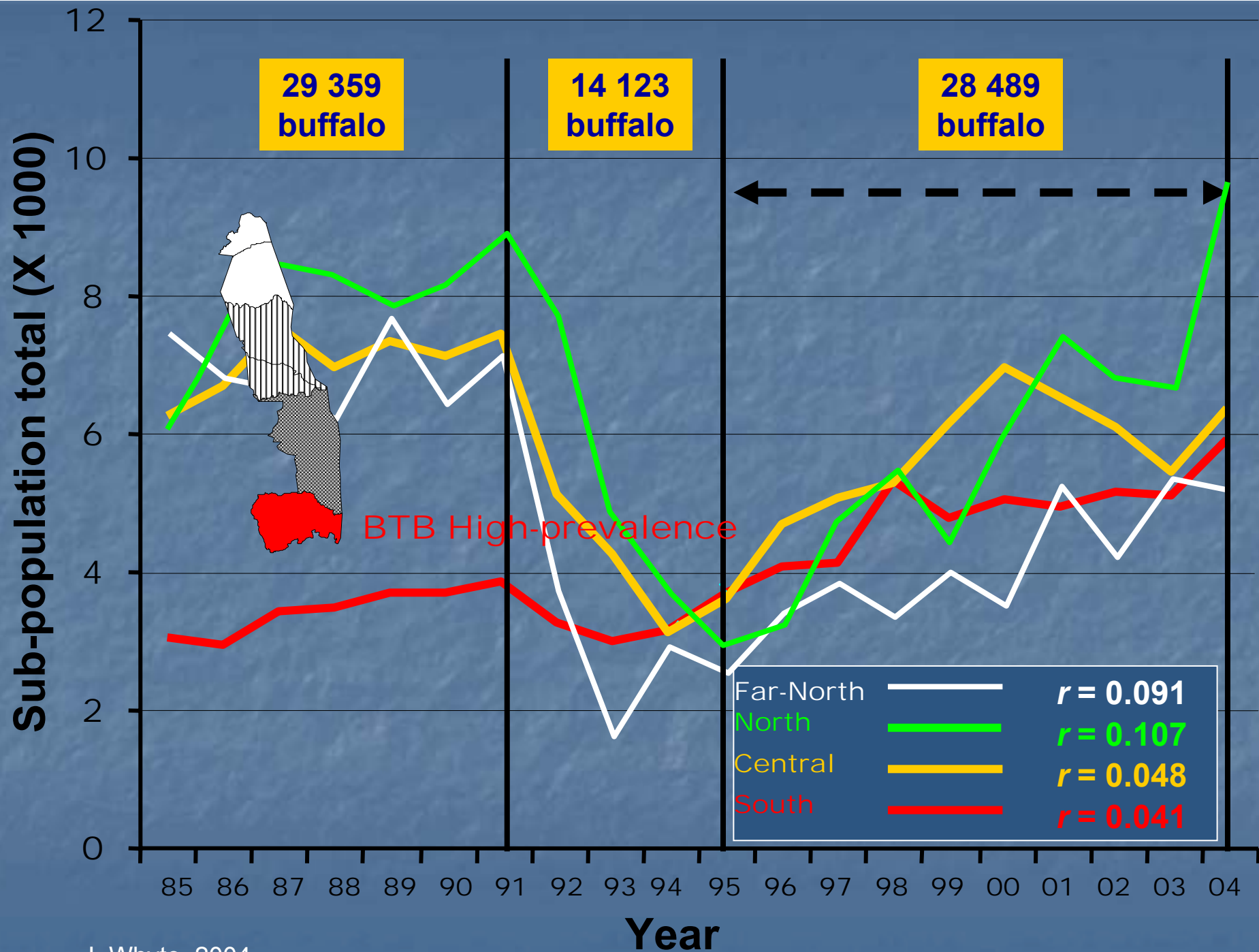
Hluhluwe-iMfolozi*

- BTB reduces both adult survival and to a lesser degree fecundity
- 11% mortality risk in adults (5 yr old expected to live for a further 6 yrs rather than 11 yrs)
- Reduced pregnancy rate in most age groups
- Population model indicates that a reduced **population growth rate** is due primarily to adult survival and less so to reduce fecundity
- A prevalence $\geq 51\%$ required to cause a negative population growth

* Anna Jolles, 2005



- **Population age structure** not materially affected by BTB
- A decrease in fecundity shifts the age population to older animals which is offset by an increase in mortality of the age group
- Reduction in population growth rate and, therefore, a reduction in a populations **resilience to environmental pressures**



BTB

- Under favourable conditions, buffalo populations will increase – be it at a slower rate
- Effects may be difficult to detect at the population level
 - No dramatic increase in mortality rates
 - No significant changes in population structure

(Jolles et al, 2005)

- Believed that there were no gender differences in BTB infection rates
- HiP this is true until animals reach maturity and then the prevalence increases in herd males
- Hypothesized that this is related to stress associated with breeding behaviour

(Jolles et al, 2004)

- KNP, buffalo herds of higher prevalence are in poorer body condition and lose condition faster during dry periods
- It is hypothesized animals in poorer condition (due to BTB) are more likely to be predated, passing the disease further up the food chain



“Should the prediction that the main effect of BTB on a buffalo population is a reduction in population growth and resilience be correct, the population would fail to recover at the rate expected in the absence of the disease following a disturbance, e.g. a drought”

(Jolle et al, 2005)

