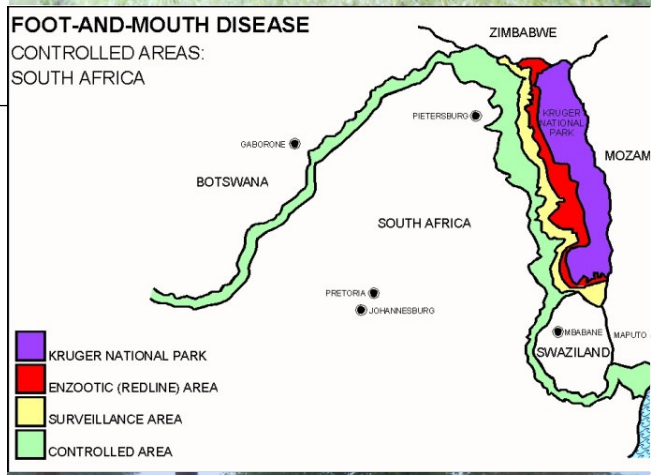
Foot and Mouth disease dynamics at the wildlife/livestock interface in the Great Limpopo Transfrontier Conservation Area.

Lessons learned (2008-2011)



Ferran Jori, DVM, PhD, UPR AGIRS, CIRAD
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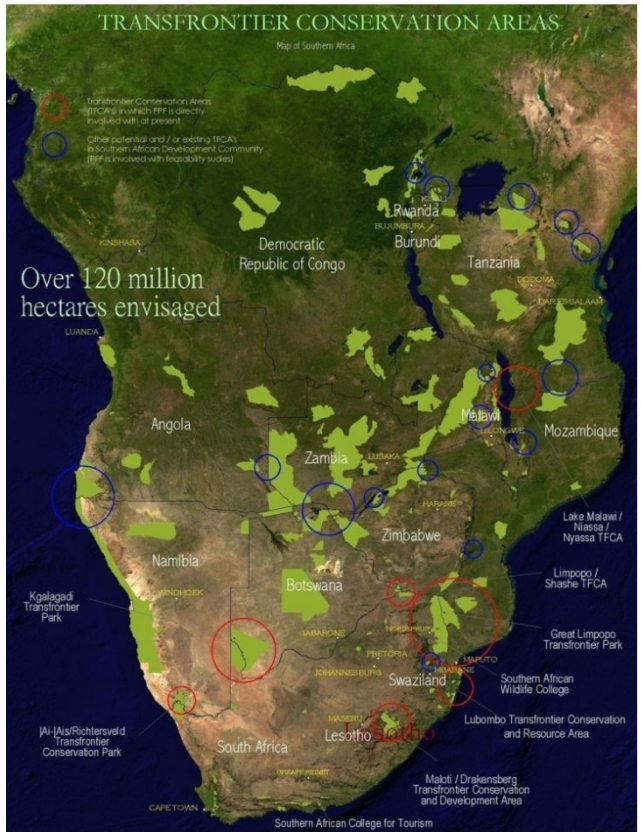
2012 GFRA Scientific Workshop, Hazyview, South Africa
17th-19th April 2012

TFCA's and FMD control in SADC Region



- The interface of those TFCA's are hot spots for FMD occurrence.
- Enormous efforts invested in FMD control in the region (Veterinary fences, periodic vaccination of cattle at the interface, surveillance at diptanks)
- FMD is re-emerging since a decade.
- Most outbreaks are linked with wildlife (buffalo) and occur around TFCA's
- Reasons are multifactorial, but TFCA's are likely to complicate even more FMD control and invite for a regional approach.

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Development of an epidemiological network for monitoring the dynamics of Foot and Mouth Disease within the GLTFCA

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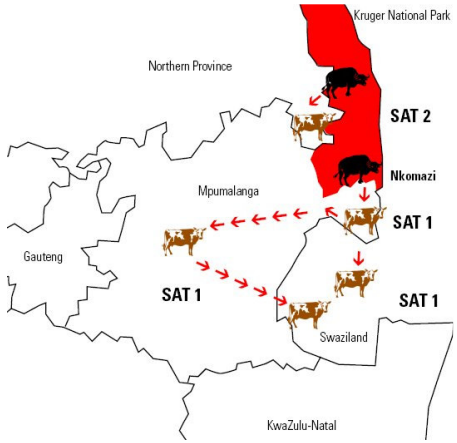
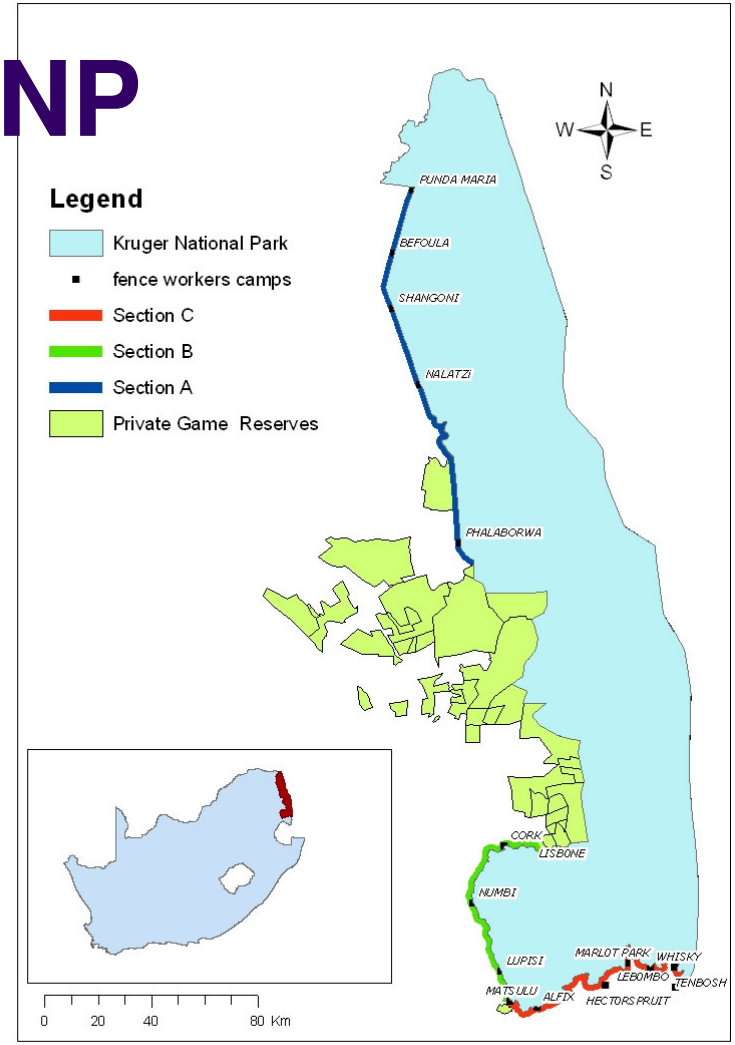
Research in the GLTFCA



- Efficiency of FMD control strategies
  - Veterinary cordon fence permeability (RSA)
  - Vaccination efficiency (Zimbabwe, Mozambique)
- Risk Analysis
  - Modelling the risk of FMD transmission (RSA)
- Transboundary movement of wildlife and FMD viruses
  - Monitoring bufalo movements and pathogens across the borders of the 3 countries of the TFCA

Fence permeability in KNP

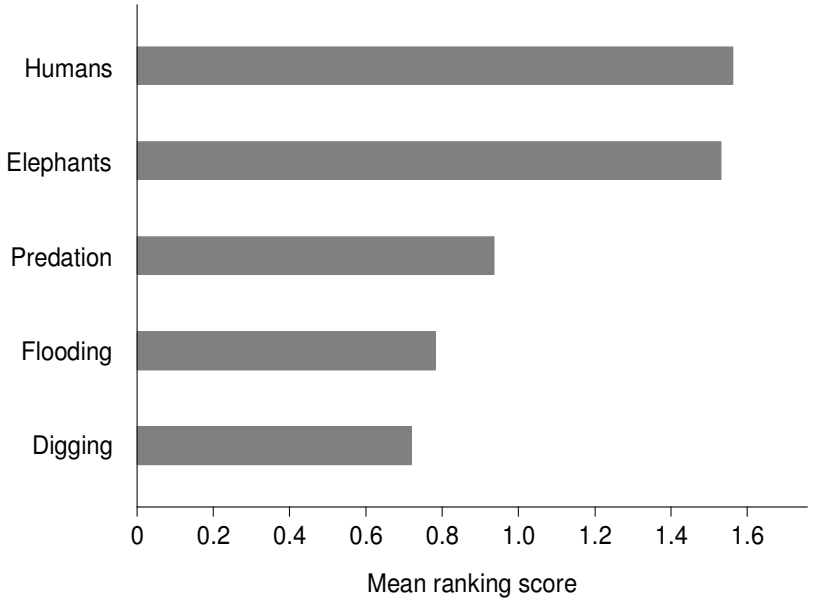
- Semi-structured, interview-based questionnaire
- 32 fence maintenance teams of 1-3 people each (epidemiological unit)
- 54 fence workers
- Study included 357 km of KNP fence (2 persons, 1 vehicle, 2 weeks)

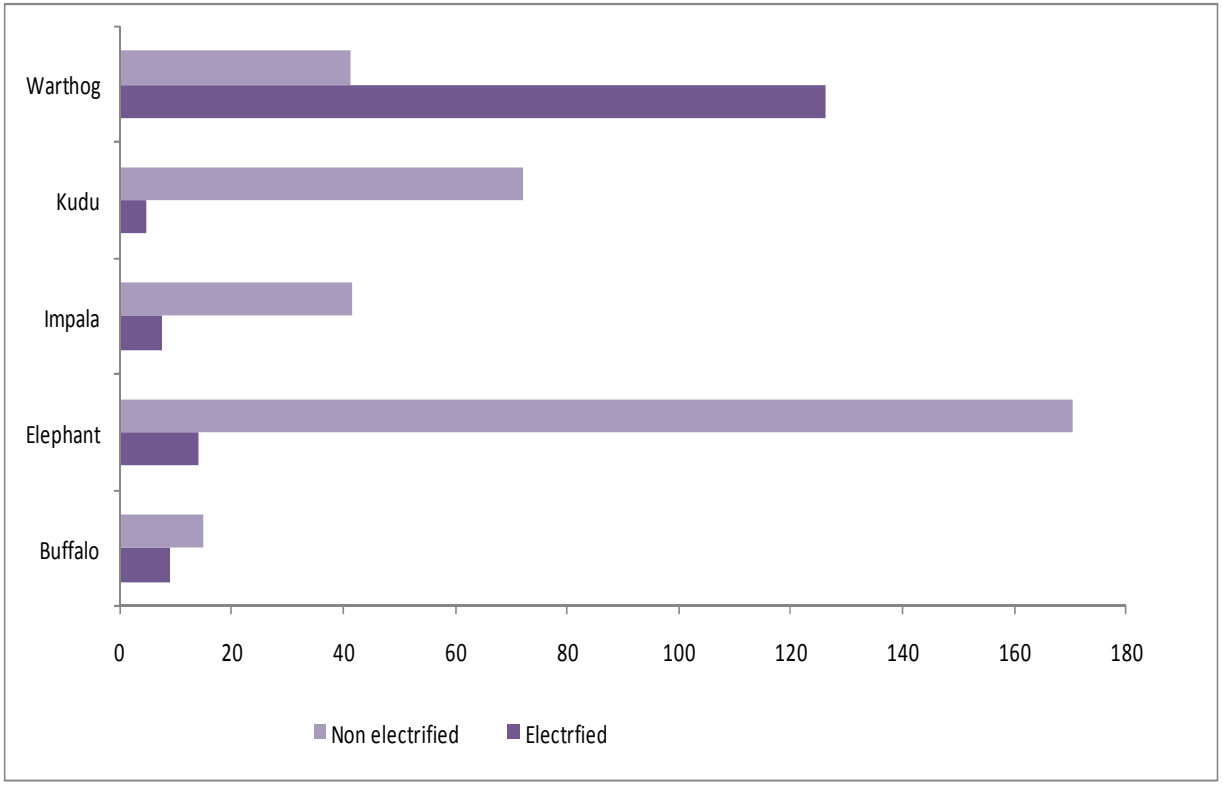


Data collected:

- Causes of fence damage
- Seasonality and duration of fence repairs
- Identification of areas with high permeability
- Influence of factors inducing wildlife mouvements across the fence

Results


Humans
Elephants
Predation
Flooding
Digging
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Mean ranking score


Warthog
Kudu
Impala
Elephant
Buffalo
0
20
40
60
80
100
120
140
160
180
Non electrified
Electrfied

Applications

- First method of fence assessment
- Rapid, cost-effective, easy to implement
- Can be used for routine monitoring fence effectiveness in other parts of Southern Africa where fences are common.

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/prevetmed

A questionnaire-based evaluation of the veterinary cordon fence separating wildlife and livestock along the boundary of the Kruger National Park, South Africa

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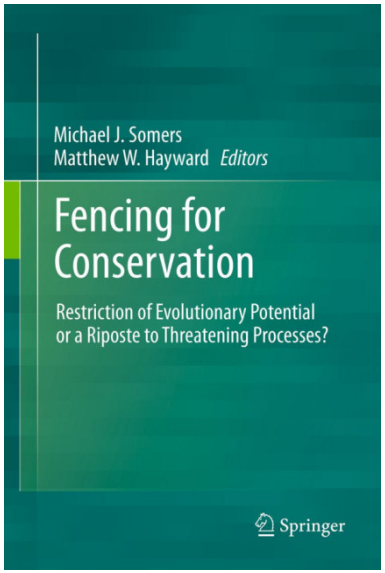
Other Applications

- Comparison of different kinds of fence, innovation in fencing methods (cf. Communal fence maintenance)

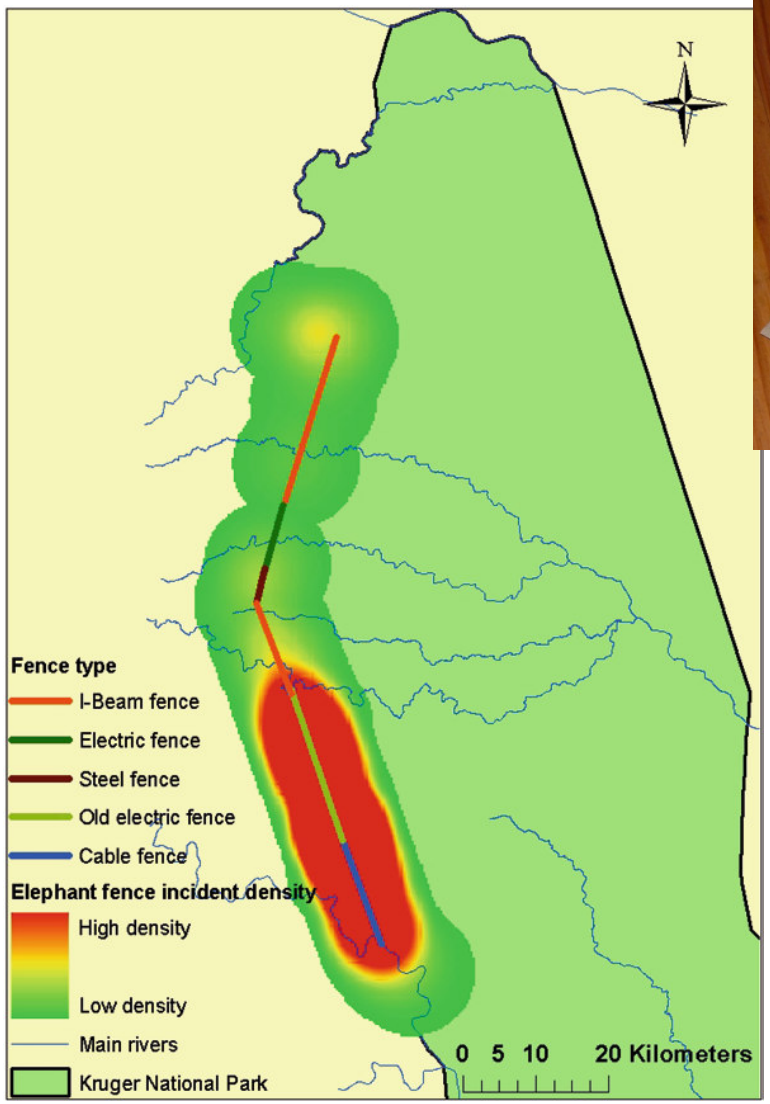
  - Some variations of the method allow the collection of spatially explicit information.

Chapter 7
An Adaptive Monitoring Programme for Studying Impacts Along the Western Boundary Fence of Kruger National Park, South Africa

Ken Ferguson, Laura Adam, and Ferran Jori



Barrier Tape System



Courtesy of Ken Ferguson, University of Glasgow

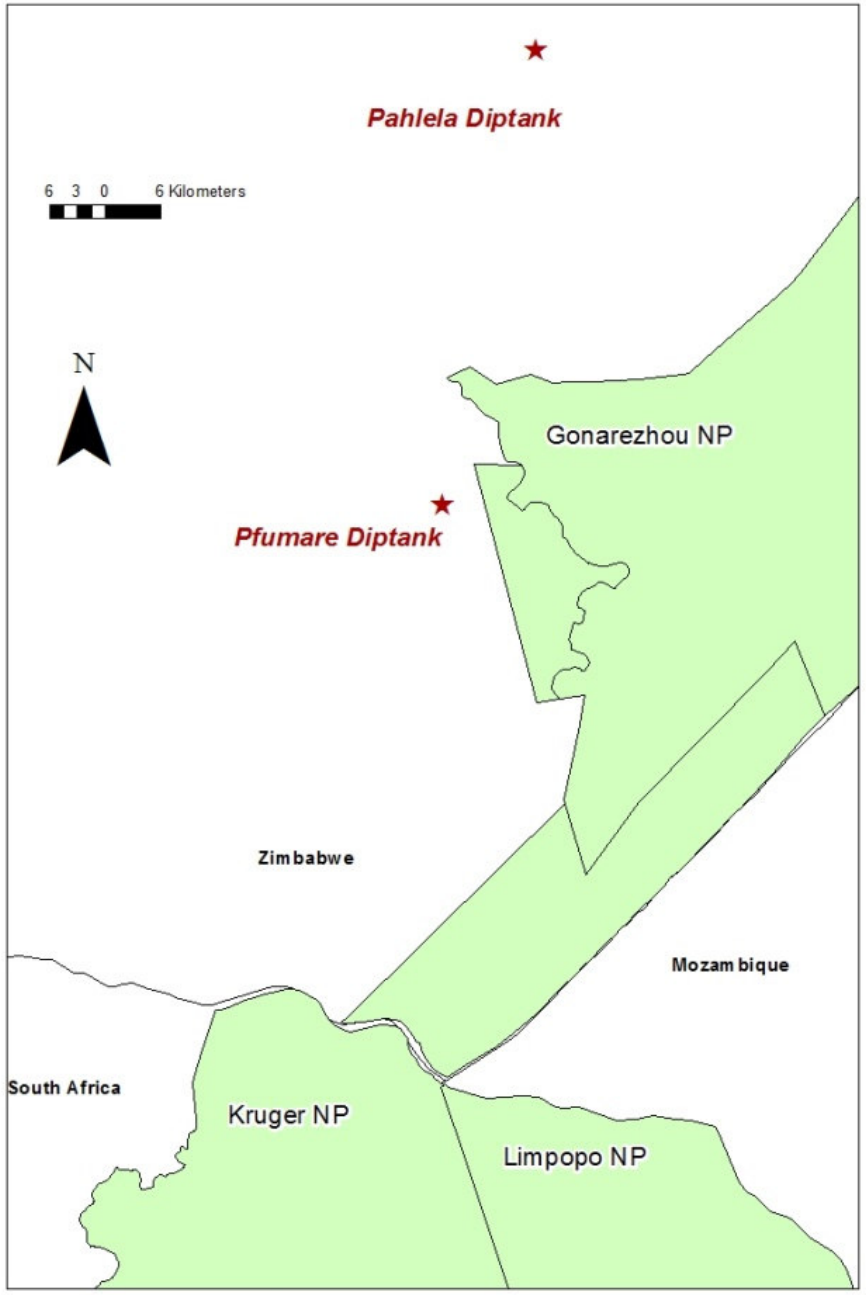
Mozambique and Zimbabwe: Vaccination efficiency trials

- To determine the antibody levels and duration in cattle vaccinated with vaccines currently available in the region

- To estimate vaccine efficacy by comparing antibody levels in vaccinated and non vaccinated cattle.

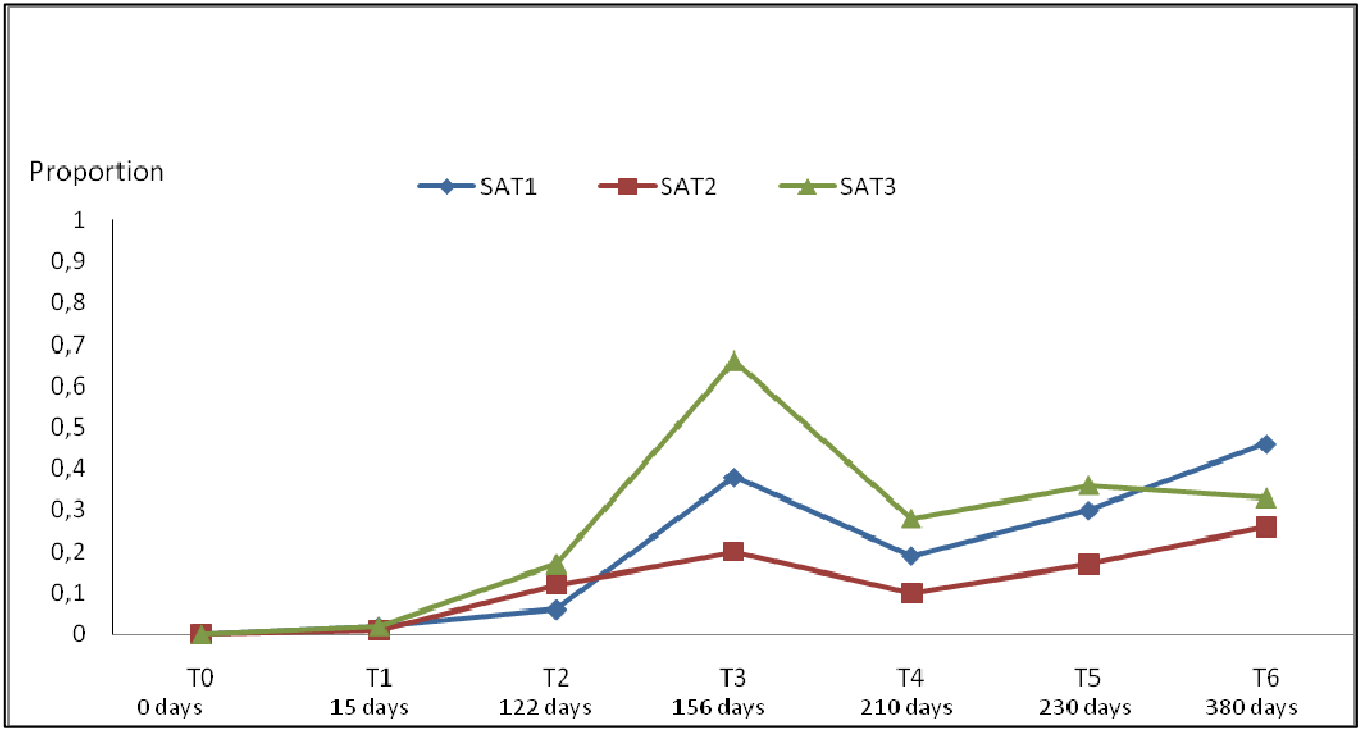
- To monitor the circulation of FMD strains in control animals at the interface.

Antibodies in sentinel animals



- 192 animals monitored
- Never vaccinated (6 m old)
- Longitudinal monitoring during 1 year
- Serological controls and T0, 15 days, 3 m, 4 m, 7 m, 8 m and 11 m.
- Tested with LPB ELISA
- Tested at T3 for NSP (CEDI Test)

Antibodies in sentinel animals



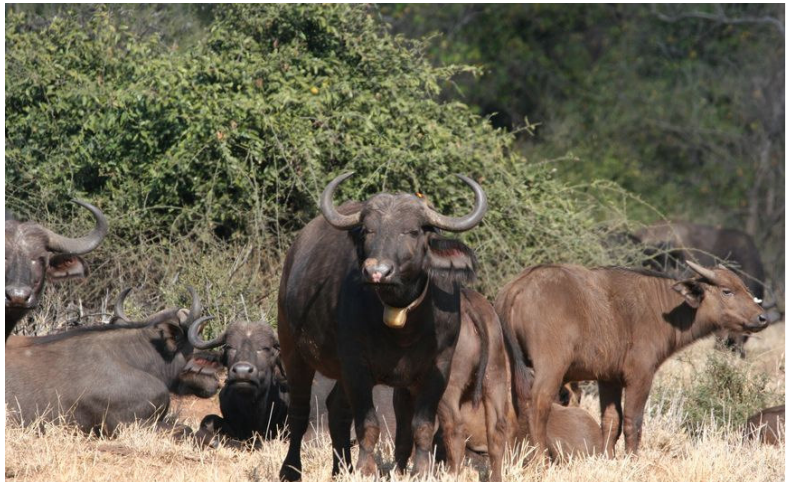
- Antibodies against SAT3 were consistently higher than for the other SAT strains except in T6
- Confirmed by NSP test at T3 (5% positive)
- No clinical signs reported by farmers or veterinary services

Consequences

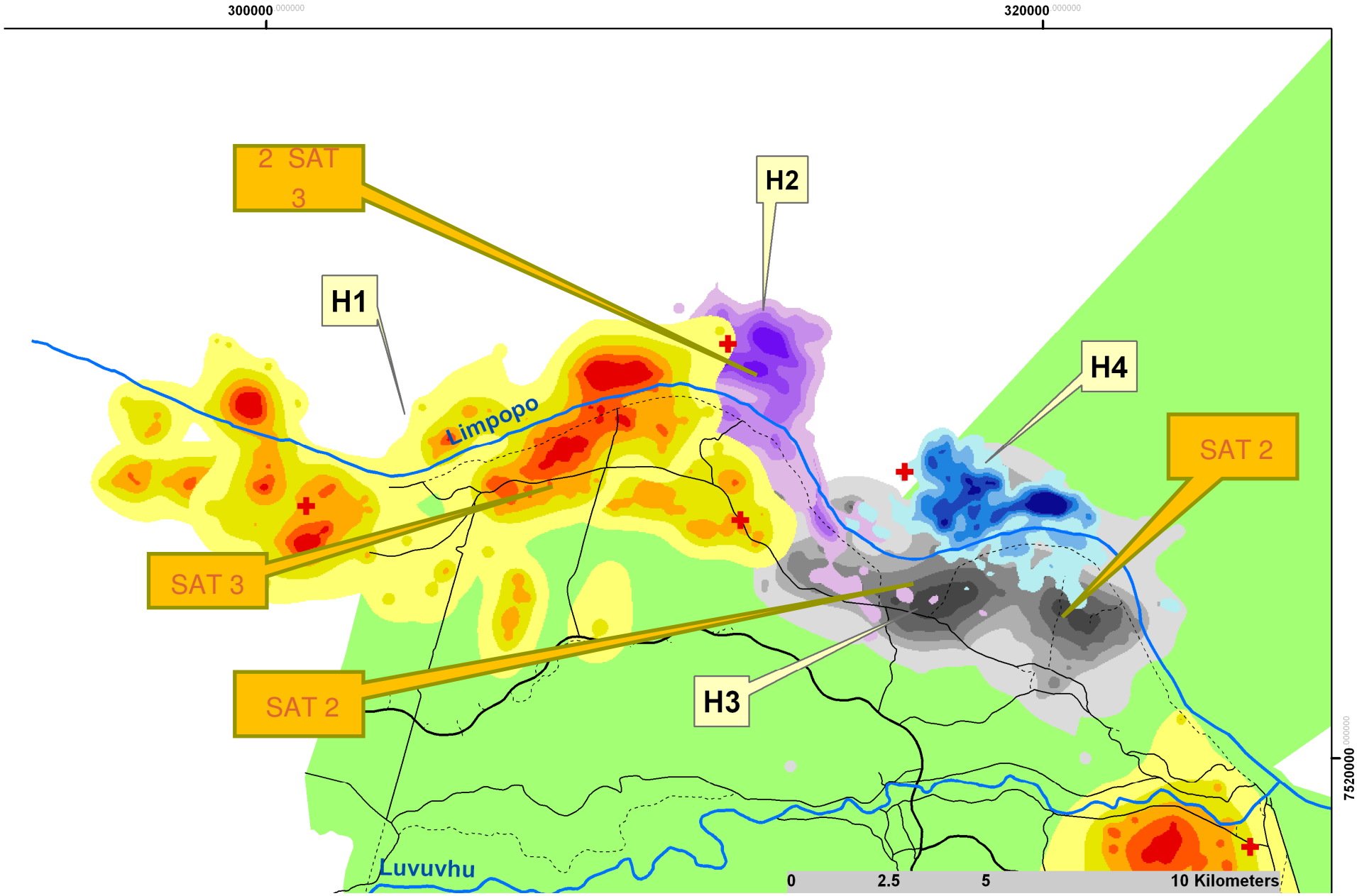
- Hypothesis of SAT 3 viral circulation among naïve animals with mild clinical signs.
- The circulation of such strains has been reported in the region in the past (70's)
- Can seriously complicate the detection of FMD infected livestock and facilitate spread of the diseases across long distances.

Buffalo movement through the borders of the GLTFCA

- Capture of buffalo herds in the borders of the TFCA
- Sampling and sequencing FMD viruses
- Monitoring movements during a year (radio-collars)

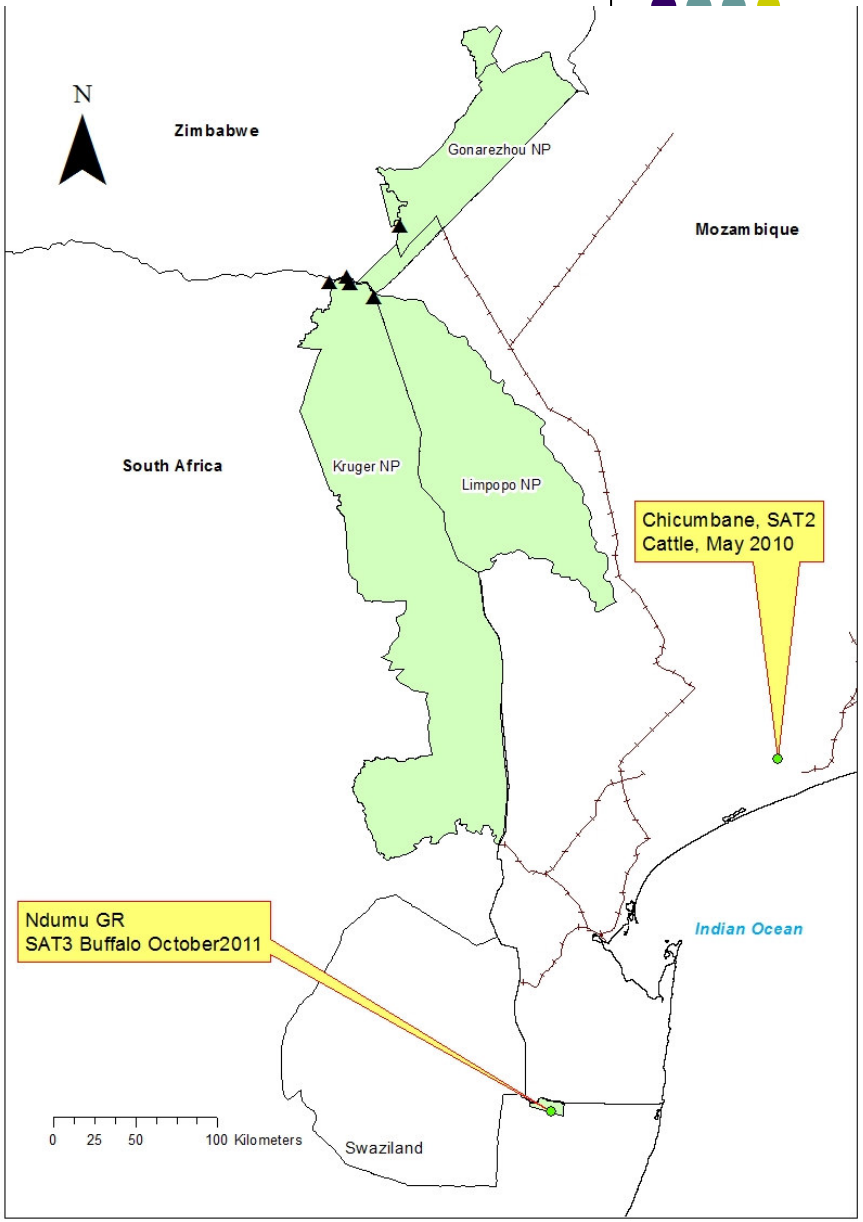


GLTFCA Buffalo movement

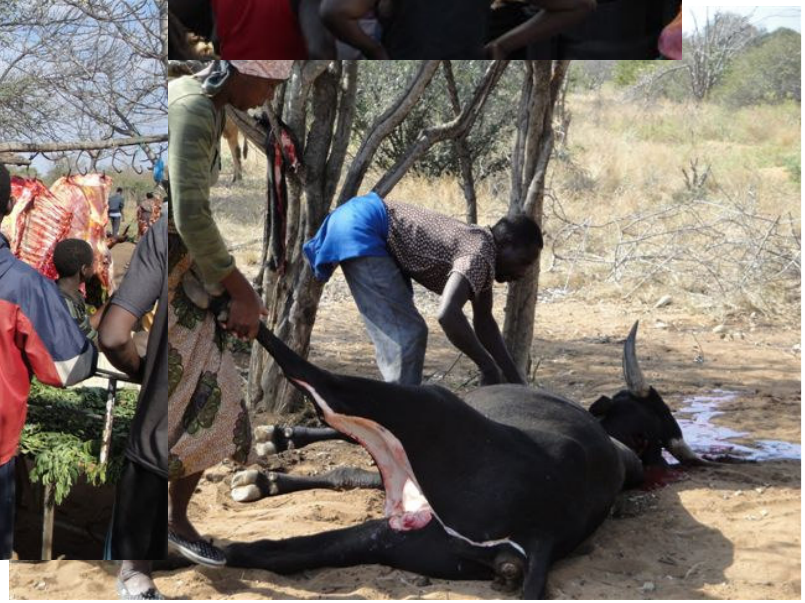


Virus phylogenetics

- SAT2 and SAT3 viruses isolated in buffalo in KNP in June 2010 were genetically very close to recent outbreaks occurred in cattle in the region:
  - SAT2 in cattle in Western Mozambique in May 2010
  - SAT3 in buffalo in Ndumu GR
- How did these viruses manage to travel such long distances ?
  - Buffalo movements- Unlikely
  - Cattle movements- more likely



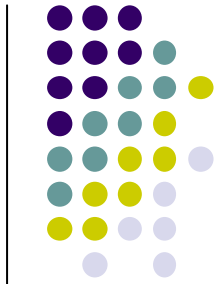
Photos, Courtesy of ILRI Mozambique



Lessons learned

- Buffalo from TFCA's can represent a source virus for cattle grazing in adjacent areas
- But cattle can disseminate those viruses through long distances, particularly if there is no movement control and outbreaks are undetected.
- Surveillance systems in the region can be challenged by the occurrence of "silent" strains.
- Traditional control strategies (fences and vaccination) need evaluation methods and tools to be re-assessed/ improved.
- TFCA's can also provide a framework for regional cooperation and epidemiological networking potential "hotspots" for transboundary disease monitoring?

Acnowledgements



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- Rosa Costa and Zacarias Massicame (formerly IIAM)


Thank you very much for your attention