

Assessment of Veterinary Laboratory Capacity within KAZA

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Workplan Objectives

| WP No. | Topic | Objective | Activity | Responsibility | Location / Scope | Timeline | Details | Priority |
|--------|-------------|--|--|--|--|------------------|--|----------|
| 4.1 | Diagnostics | Improved speed & accuracy of diagnoses to improve disease management | Survey of diagnostic capacity within KAZA (including listing labs that are accredited for certain tests) | Team to source info: Foggin (VFWT); Hanyire (ZW); Mbeha (BW). Nyika to provide info from LTC (via Manyire) | Initially desktop study; ZW chairing LTC lab sub-committee (indicated some info already there) | 2019 | Progress envisioned within one year. Conduct survey for disease risk assessment capacity, with view of more efficient use of resources within KAZA | L |
| 4.2 | Diagnostics | Improved speed & accuracy of diagnoses to improve disease management | Promote use of regional (KAZA) facilities/labs | TBD | TBD | Likely 2020-2021 | Progress envisioned once survey of diagnostic lab capacity completed. To increase efficiency esp. related to wildlife diseases | B |

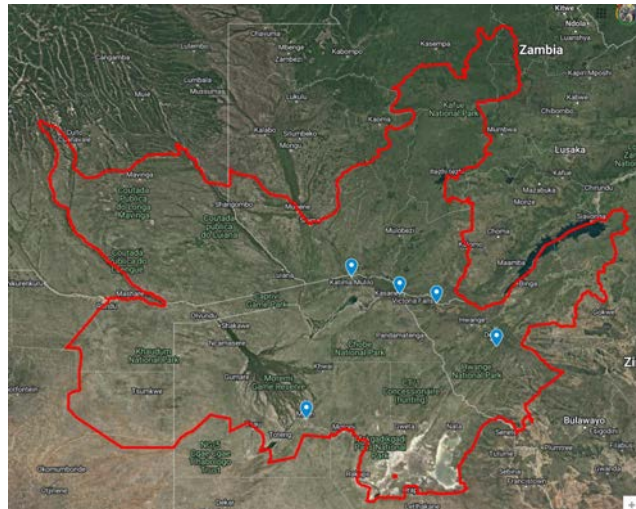
Prof Mary-Louise Penrith

- Extraordinary Professor at University of Pretoria
- Laboratory management advisor
- Transboundary animal diseases
- Prior experience working in KAZA and southern Africa



Laboratories Identified

- Maun DVS Satellite Laboratory (Maun, Botswana)
- CARACAL/Chobe Research Institute Laboratory (Kasane, Botswana)
- Victoria Falls Wildlife Trust Laboratory (Victoria Falls, Zimbabwe)
- Zimbabwe Parks and Wildlife Management Authority Laboratory (Hwange National Park, Zimbabwe)
- University of Namibia at Katima Mulilo Laboratory (Katima Mulilo, Namibia)



Non-Participants

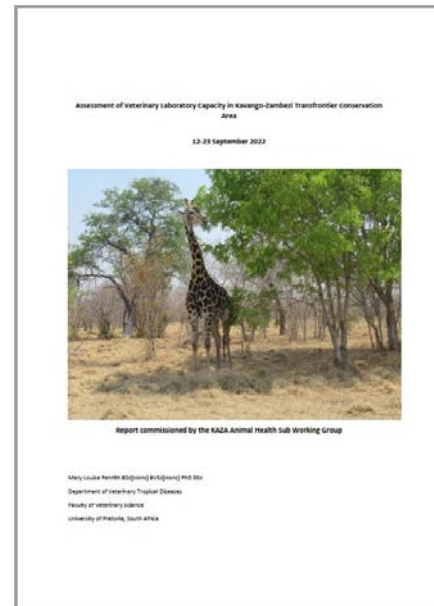
- UNAM Katima Mulilo
 - Basic parasitology
 - Sample processing for UNAM Windhoek
 - Future site of One Health laboratory serving KAZA
 - research and diagnostic services in collaboration between veterinary, medical, environmental and wildlife professionals
 - anti-microbial resistance
 - parasitology
 - zoonotic diseases
 - climate change
 - social issues (e.g. human-livestock-wildlife conflict)
 - Farming System Research and Extension (FSRE)
 - diseases at the interface

Non-Participants

- Mtshibi Lab
 - Zimbabwe Parks and Wildlife Management Authority
 - Support from International Fund for Animal Welfare (IFAW)
 - PCR machine, microscope, other equipment

Assessment Timeline

- August-September 2022
 - Outreach to laboratories
- September 2022
 - Visited 3 KAZA laboratories in Maun, Kasane, Vic Falls
- October 2022
 - Report submitted by Prof Penrith
- November 2022
 - Brief presentation to AHSWG SC
- December 2022
 - Draft report disseminated to full AHSWG



Botswana DVS Satellite Laboratory



- BSL1 with BSL2 pending once cabinet installed
- Use limited to DVS use currently
- Small throughput; mostly samples from vaccination campaigns that are then sent to BNVL
- Has parasitology capacity (faecal egg counts, parasite identification)
- Future plans for FMD NSP

- Only one staff member, yearly contract basis
- Small laboratory space
- Building to be taken over by NARDI; uncertain future status
- No backup power and some electrical surges
- Inconsistent water supply

CARACAL



- Research focus on One Health
- BSL2 lab
- Offers training opportunities for Botswana microbiology graduates
- Focus on molecular genetics, bacteriology
- Future plans for digital information portal of research data

- Dust poses a risk to sensitive equipment
- Lack of permanent middle-order staff
- Need for collaboration among research entities in KAZA

Victoria Falls Wildlife Trust Laboratory



- Diagnostics and forensics
- BSL1 with upgrade to BSL2 pending at assessment
- Histopathology, infectious disease diagnostics
- Future plans for genome sequencing and increasing molecular diagnostic capacity

- Laboratory tours may compromise biosecurity
- Potential problems with expanding based on location
- Sample shipping challenges noted

Comparison of Diagnostic Capacity

| Lab | Bacteriology/ microbiology | Antimicrobial sensitivity | Chemistry/ toxicology | Clinical pathology |
|---------|---|------------------------------|--|---|
| Maun | None | No | None | None |
| CARACAL | <i>Salmonella</i> <i>E. coli</i> <i>Campylobacter</i> | Yes | Water quality (TSS) | Haematological Faecal glucocorticoids |
| VFWT | <i>Pasteurella</i> <i>Mycobacterium bovis/TB</i> <i>Bacillus anthracis</i> <i>Brucella abortus</i> | Yes (outsourced) | Cyanide Lead (outsourced) Mercury (outsourced) Pesticides (outsourced) | Total protein Urine specific gravity Manual cell counts Smear cytology |

Comparison of Diagnostic Capacity

| Lab | Molecular diagnostics | Parasitology | Serology | Pathology | Virology |
|---------|--|--|--|---|----------|
| Maun | None | Parasite identification (haemoparasites, ectoparasite) Faecal flotation | FMD NSP outsourced | None | None |
| CARACAL | Conventional PCR | Parasite identification Faecal flotation Faecal sedimentation | ELISA (not currently done) | Gross pathology Histopathology outsourced | PCR only |
| VFWT | Conventional PCR Quantitative PCR 16S identification of cyanotoxins Bird sexing <i>Loxodonta</i> localizer for ivory | Faecal flotation Parasite identification Buffy coat wet preps | Rose Bengal test Dual path platform for TB Crocodile faecal corticosteroid ELISA | Gross pathology Histopathology | PCR only |

Comparison of Forensic Capacity

| Lab | Forensics |
|---------|--|
| Maun | None |
| CARACAL | Forensic pathology Site investigations Toxicology sample extraction DNA collection/extraction Training |
| VFWT | Toxicology Species identification <i>Loxodonta</i> localizer for ivory |

Strengths & Weaknesses

- Labs well-equipped
 - Experienced professional staff
 - Support from relevant government departments
 - Links to/collaboration with labs outside KAZA
 - Labs clean and well-managed
 - Diagnostic labs working towards accreditation
- Lack of some advanced equipment
 - Harsh environmental conditions
 - Experienced staff near/past retirement age
 - Shortage of staff or high turnover
 - Challenges in obtaining reagents or moving samples
 - Lack of space for expansion
 - Limited viral diagnostic capacity
 - No labs currently accredited

Opportunities & Threats

- Laboratory services are important for KAZA
 - Need for/interest in One Health approaches in interface areas
 - High revenues from tourism in the region to support wildlife services
 - Accreditation agencies available in SADC region
- Inability to find suitable replacements for experienced staff
 - Uncertain sustainability of funding streams
 - Weakness of infrastructure (electricity and water) increases operating costs
 - Tourism revenues vulnerable to adverse conditions

Recommendations

- Consider sustainability in terms of staff and funding
- Implement back-up electricity and water storage if not in place
- Greater collaboration among laboratories

Final Thoughts

- Capacity for laboratory visits
- Necessity of improved sample movements for international laboratory usage