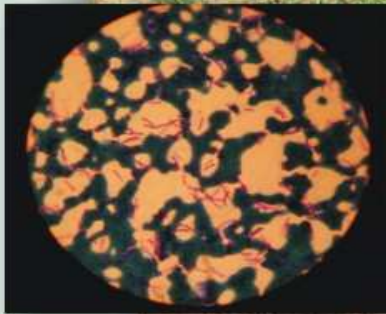




TAWIRI - Messerli Foundation
Wildlife Veterinary Programme



ANNUAL REPORT 2009



**ANTHRAX
OUTBREAK
MASWA AREA
OCTOBER 2009**



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Abbreviations

ADRI	Animal Disease Research Institute
AfESG	African Elephant Specialist Group (part of IUCN -SSC)
CISA	Centro de Investigación en Sanidad Animal (Spain)
CVL	Central Veterinary Laboratory (part of MLDF, formerly ADRI)
FCF	Friedkin Conservation Fund (NGO in Tanzania)
FZS	Frankfurt Zoological Society (International conservation NGO)
GPS	Global Positioning System
GR	Game Reserve (administered by WD)
HEC	Human-elephant conflict
HWC	Human-wildlife conflict
ILRI	International Livestock Research Institute (Kenya)
IUCN	International Union for Conservation of Nature
MLDF	Ministry of Livestock Development and Fisheries
MNRT	Ministry of Natural Resources and Tourism
NCA/ NCAA	Ngorongoro Conesevation Area / Ngorongoro Conesevation Area Authority
NP	National Park (administered by TANAPA)
OIE	Office Internationale des Epizooties (UN agency monitoring animal diseases worldwide)
PAC	Problem Animal Control
PCR	Polymerase Chain Reaction (to amplify DNA contained in samples)
SNP	Serengeti National Park
SUA	Sokoine University of Agriculture, Morogoro Tanzania
SWRC	Serengeti Wildlife Research Centre – home base of this programme
TANAPA	Tanzania National Parks (responsible only for NPs, not other wildlife areas)
TAWIRI	Tanzania Wildlife Research Institute
TNRF	Tanzania Natural Resources Forum
VHF	Very High Frequency (for radio-collars)
VIC	Veterinary Investigation Centre, (MLDF – zonal laboratories)
WSPA	World Society for Protection of Animals

1 INTRODUCTION and OBJECTIVES

This document reports on progress in the TAWIRI – Messerli Foundation Wildlife Veterinary Programme during the past year, 2009/10. The programme (which has been operational since 1992) tries to meet the requirements for veterinary support to the wildlife sector in three main areas: (i) original research (mainly into the epidemiology of pathogens in wildlife – investigating host-parasite relationships and the ecological significance of pathogens; (ii) veterinary support and advisory services to wildlife research and management agencies; and (iii) a training programme for Tanzanian wildlife personnel, both our own staff and others.

There main distinction is between (i) **long-term research activities** that are complex, mainly internal and vary between years, and (ii) **routine activities** that often involve services to other projects or wildlife authorities and remain similar between years. Disease research concentrates on conditions that can be associated with both wildlife and livestock or are important zoonoses. Human-wildlife conflict advisory work concentrates on human-elephant conflict in Tanzania, but assists both investigative and management aspects of the problem.

The recent research and routine work has been carried out mostly by Dr Richard Hoare and Dr Bugwesa Zablon but Dr Robert Fyumagwa still contributes to many aspects of the programme. A well-trained laboratory technician and two non-professional staff based at SWRC support the work of the veterinarians.

2 LONG-TERM DISEASE RESEARCH AND SURVEILLANCE

2.1 Tick-borne disease

Our study of tick ecology and tick-borne disease has been on-going since the well-described deaths of black rhinoceros (*Diceros bicornis*) in Ngorongoro crater in 2001 revealed previously unknown *Babesia* and *Theileria* pathogens (Nijhof *et al* 2003). Publication of one manuscript on tick ecology (Fyumagwa *et al* 2007) was supplemented in 2008 by one describing tick-borne haemo-parasites in carnivores (Fyumagwa *et al* 2008a) and another in herbivores (Fyumagwa *et al*, 2008b – appearing in 2009) in international journals.

In 2009 the Ngorongoro crater was revisited and the tick counting transects previously used were repeated. This showed that the controlled burning regime in the grassland appears to be keeping tick numbers in check, therefore avoiding a high level of disease threat to wildlife. This monitoring ensures that our applied research study continues to benefit the management of the Ngorongoro Crater ecosystem.

2.2 Brucellosis

Our long-term surveillance started in 2003 and by 2006 we had established a level of sero-prevalence in buffalo and wildebeest (Fyumagwa *et al* 2007c). Thereafter attempts to isolate the bacterium from wildebeest fetal membranes were unfortunately unsuccessful.

The research effort was continued in 2009 by systematic sampling of 500 cattle resident in 8 villages adjacent to SNP. *Brucella* sero-prevalance that we have so far tested from the sample bank is now: Cattle 11.5% (n=607) Buffalo 24% (n=103) Wildebeest 17% (n=107). The known epidemiology of *Brucella* in wildlife and livestock after several years of our investigations was presented at the 7th TAWIRI Scientific conference: **Seroprevalence of *Brucella abortus* in livestock-wildlife interface of the Serengeti ecosystem by Bugwesa Zablon., Fyumagwa, Robert., Maulidi Mdaki., Sayel Kuya & Hoare, Richard.**, with reference to previous work (Godfroid, J. 2002).

2.3 African Swine Fever (ASF)

From investigations since 2004 we have isolated ASF virus from warthog tissues but not had many samples to work with. By 2009 our collection of archived warthog sera and tissues had built up (60 samples through collaborative work on trypanosomes), so these were sent to ILRI (International Livestock Research Institute) in Kenya and onward to the ASF world reference laboratory in Spain (CISA-INIA). The infection picture that emerged was quite typical for East African warthogs: sero-positivity (exposure) in all cases, but no actual virus material could be recovered from this batch of blood or tissue.

Without a vaccine ASF control relies on rapid diagnosis and physical measures, so currently much effort is being directed towards the use of new molecular techniques. We were fortunate to be offered an African Swine Fever Molecular Diagnostics Course for two of our staff: Dr Bugwesa Zablun, attended a one week course in Uganda and laboratory technician Mr Maulidi Mdaki attended at CVL Dar es Salaam.

2.4 Rift Valley Fever (RVF)

This mosquito-borne virus disease appears after heavy wet seasons and was much publicized in 2007 after a serious outbreak in East Africa. In order to determine the RVF status in Tanzanian wildlife we submitted 418 archive serum samples from 13 species that were tested in CVL (Central Veterinary Laboratory DSM) in 2008.

Although there are some difficulties with testing, results we received in 2009 suggested very low exposure in wildlife (3%). In 2009 we also received a request from VIC (Veterinary Investigation Centre) Arusha for further testing using a different technique and had these same samples transferred there.

We are pleased that Dr Robert Fyumagwa is applying to the African Research Consortium for Ecosystem and Population Health (Africa One) for resources to continue research into this important and elusive virus.

2.5 Baboon genital disease

Research on this erosive genital disease condition started in 2000 and is no longer active within our programme, having been taken over by an independent project in Manyara National Park. A long-awaited publication on the cause - an apparently distinct strain of the *Treponema* bacterium - has been submitted to several journals by our collaborators in Germany and the USA. Although it received very good previous reviews at the best scientific journals, it has been rejected on the basis of the subject not being broad enough in interest – i.e. too specialized for their readership. Some of the findings have been presented by our collaborating authors at a symposium in 2009: the Annual Meeting of the American Association of Physical Anthropologists. They continue to look for a journal that will publish the paper.



Cattle photos Courtesy of Dr Zablon

LONG TERM DISEASE RESEARCH & SURVEILLANCE

Systematic sampling of cattle within villages neighbouring the SNP continues. This was primarily for Brucellosis but tests can be done for almost all potential pathogens listed in this report.

3 ROUTINE DISEASE INVESTIGATION ACTIVITIES

3.1 Anthrax

We continued monitoring for Anthrax which occurs naturally in all ecosystems. In 2009 we diagnosed Anthrax after a visit to Maswa Game Reserve in giraffe and buffalo (in which a rare clinical case was seen). An outbreak ensued in which 91 buffalo and two giraffe carcasses were found by the safari operator, and the vast majority were thought to have died acutely from anthrax. Other species possibly involved were eland, warthog, duiker (1 each) and elephant (5). The epidemiology followed the pattern of a classical dry season anthrax outbreak. We are compiling a separate report with extensive advice covering human safety concerns and also what controls can be applied in the wild. This report is targeted at personnel across the wildlife sector.

During 2009 we also examined blood samples from occasional deaths of hippos in Serengeti National Park (SNP), but due to carcass decomposition suspected Anthrax could not be confirmed.

Two scientific papers on Anthrax with our collaborators (mainly the TAWIRI carnivore disease researchers) are in the late stages of preparation in 2010 and contain very exciting new information on the disease. We supplied large numbers of archive herbivore samples for the research. One paper is on sero-surveillance and the other on epidemiology of anthrax in the Serengeti ecosystem. A summary of the findings was presented by our partners at an international symposium: the Twelfth Conference of the International Society for Veterinary Epidemiology and Economics (ISVEE XII) held from 10-14 August 2009 in South Africa.

3.2 Trypanosomiasis

The parasite is widespread in our ecosystems and we continue to monitor any appearance of clinical cases. We did most of our initial work on an animal that acts as a very good sentinel species, the domestic horse - producing the first definitive research for some decades with our collaborator using new molecular techniques (Auty *et al* 2008). After believing that we had the threat under control, four horses died in 2009 and we are conducting detailed investigations into possible shortfalls of the prophylactic drug regime in use.

Three human clinical cases of *Trypanosoma* infection occurred in Serengeti in 2009, of which one was a member of our staff, definitely bitten by tsetse fly near Seronera. He was extremely ill and rushed to hospital by aircraft, where he received a course of treatment and recovered uneventfully. We have obtained the necessary drug for future cases. The presence of tsetse fly was reported from near Arusha in 2009 and on investigating we believe that safari vehicles returning with tsetse flies may be responsible for small fly populations remaining viable outside their normal range.

3.3 Rabies

There is now a reasonable understanding of Rabies in the Serengeti as a model of a large wild ecosystem (Lembo *et al* 2008) – an study in which the TAWIRI veterinary programme played an important role. The current need is to improve diagnostic capacity as an aid to control. This was accomplished in 2009 by our laboratory technician Mr Maulidi Mdaki attending a Rabies Diagnostics Course at the Central Veterinary Laboratory (CVL) Dar es Salaam. This has resulted in the TAWIRI Veterinary Laboratory at SWRC being able to do rapid and effective Rabies diagnosis, using the new Direct Rapid Immuno-fluorescent Test (DRIT test). This requires only a standard microscope and is thus a great advance in rapid and cheap diagnosis, especially if there is human exposure to Rabies. In northern Tanzania, Mwanza VIC and ourselves can now perform this service.

3.4 Tuberculosis

TB is widespread and fairly prevalent in livestock and humans but up to now has been seen sporadically in wildlife in Tanzania and we have recorded few clinical cases. However, it remains a serious concern because of the damage it can inflict on wildlife populations if it takes hold in protected areas. As such we are very pleased that as from 2010 Dr Bugwesa Zablon has been accepted into a PhD level research programme on TB (under Southern African Centre for

Infectious Disease Surveillance - SACIDS, funded by the Wellcome Trust), investigating genetic and transmission aspects of the pathogen between livestock, humans and wildlife. The academic base will be at Muhimbili University of Health and Allied Sciences (MUHAS).

3.5 Foot and Mouth Disease (FMD)

This non-fatal livestock disease has a reservoir in buffalo. With advances in molecular level investigations, improvements in the currently poor vaccine may be achieved by better typing of viral strains. Extensive discussions and correspondence was exchanged between ourselves and other researchers setting up a nationwide four year project in wildlife sampling and virus genotyping for FMD, starting in 2010.

3.6 West Nile Virus (WNV)

A laboratory in South Africa that examined samples from one of the cases of *Trypanosoma* in horses (above) reported the presence of WNV – another mosquito-borne viral disease. Research on viruses in zebra that was previously done by the veterinary programme (Borchers *et al* 2005, Borchers *et al* 2008) offered the opportunity to examine a wild equid species for WNV because sample aliquots that could be retested remained in a laboratory in Germany. WNV exposure in zebra appeared to be low (3%).

3.7 Wildlife Sample Bank

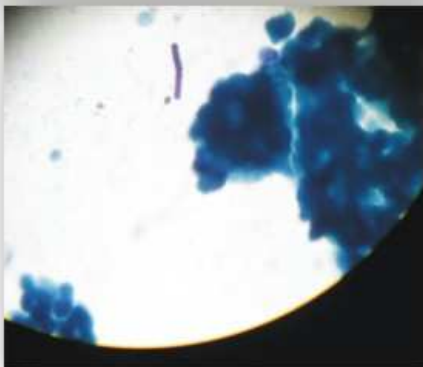
Sample collection and storage in a bank has been a major routine activity since the veterinary programme began in 1992. Much of the long-term and routine disease research revolves around the wildlife sample bank. Unfortunately there are much fewer samples remaining from the period 1992-1997 but the collection of well-preserved biological material is continuous and complete for the last 12 years (1998-2009 inclusive). With continual improvement of laboratory techniques and disease tests, the sample bank grows constantly in value.

Table 1 Details of wildlife samples acquired and released in 2009

ACQUISITIONS into the collection				
	No. SPECIES	No. SAMPLES		
	15	731		
RELEASES from the collection				
TEST FOR	SPECIES	No. SAMPLES	SENT TO	POSITIVES
Theileria parva	Buffalo Cattle	152	SUA Tanzania	Pending: very likely
African Swine Fever Virus	Warthog	61	Spain	Yes (100%)
West Nile Virus	Zebra	70	Germany	Yes (3%)
TOTAL		283		

The 2009 Serengeti cattle blood samples are very useful multiple use samples so have been archived for future testing for exposure to other conditions e.g.: TB, Trypanosomes, Rift Valley Fever, Foot and Mouth Disease, Anthrax and tick-borne haemo-parasites. Faecal samples from the same cattle in 2009 were examined for *Cryptosporidium*, an intestinal zoonosis but the results are not yet quantified.

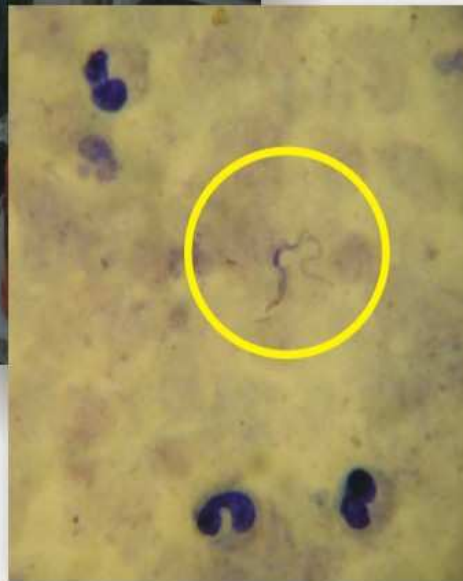
Other researchers increasingly used our SWRC laboratory for preliminary processing of their own samples, for example extracting hormones from faeces. In this way the laboratory provides an increasingly valuable service to the research community.



**ROUTINE DISEASE
INVESTIGATION ACTIVITIES**

ANTHRAX OUTBREAK - Maswa Game Reserve

A very rare case of a live buffalo showing clinical signs of bleeding from eyes and nostrils (top). Samples taken Drs Fyumagwa and Hoare after its death (centre) resulted in confirmation of anthrax, seen under a microscope at the SWRC laboratory (bottom).



**ROUTINE DISEASE
INVESTIGATION ACTIVITIES**

TRYPANOSOMIASIS

Veterinary programme staff member, Mr Jimmy Koromba, receiving treatment at Wasso hospital in Loliondo. Initially very seriously ill, he was rushed to hospital in the TAWIRI aircraft (by Dr Richard Hoare) and successfully treated over a two week period for this rare but dangerous infection..

4 LONG-TERM ADVISORY WORK

Human – Elephant Conflict Research and Management

The study of HEC in Tanzania has been following a plan since 2006 (Hoare 2007a,b), supported by the IUCN African Elephant Specialist Group (IUCN–AfESG) of which Dr Richard Hoare is a member and co-chairman of the Human-Elephant Conflict Working Group for Africa. Tanzania, being one of the most important elephant range states, has become a focus country for how to integrate the efforts of those involved in this problem at all levels – from rural subsistence farmers right up to centralized authorities (Dublin & Hoare 2004, Parker *et al* 2007a,b). The main objective of the research into problem animals and human-wildlife conflict is: (i) to provide wildlife managers with information that can improve practical measures to control problem animals and (ii) to provide administrators and politicians with information to replace flawed short-term interventions with more sustainable long-term measures that strengthen community conservation initiatives. The veterinary programme is very well placed to undertake problem animal research and advisory work as an additional activity. The number of independent researchers presenting their work on the subject of human-elephant conflict at the last TAWIRI conference is testament to the importance of this subject. They all contribute to the above initiative on HEC in Tanzania and field sites where data has been collected are numerous: West Serengeti, West Kilimanjaro, Rombo District, Kagera Region, and selected areas around Tarangire, Mikumi, Ruaha and Katavi National Parks and Selous Game Reserve (Malima *et al* 2004).

In 2009 we were responsible for guiding a consultancy team of two individuals to produce an overview of the human-elephant conflict situation in the country, specifically for inclusion in the update of the national elephant management plan in Tanzania (undertaken by WCS, TAWIRI and national collaborators). This involved a lot of correspondence, several meetings, a field trip showing the consultants the HEC zone in west Serengeti, and reviewing the draft document produced.

One of the consultancy team was Mr Enock Chengullah who is the wildlife program officer at TNRF (Tanzania Natural Resources Forum). Having originally suggested this position - involving dealing with government and all stakeholders on human wildlife conflict issues (Hoare 2007a) - I continued to advise and assist his work-plan and professional development in 2009 and suggest ways forward for this important initiative.

Extensive discussions were held with WSPA (World Society for Protection of Animals), a worldwide NGO with its Africa headquarters in Dar es Salaam. They were interested in supporting research work on HEC. We suggested that if they wanted to do this at a field site, near Mikumi National Park might be suitable, and this led to a meeting at TAWIRI at which a collaborative project was formalized. Mr Lucas Malugu of TAWIRI assisted WSPA in the field and their project is underway.

A study plan for Mr Lucas Malugu was developed to assist him in his MSc degree, based on his HEC research in west Serengeti since 2005. Important questions were suggested for him to evaluate the uptake of mitigation measures against problem elephants in villages and we refined his research programme that is being done at SUA.

We have been negotiating with a donor and a film producer to try to get underway the production of a simple film that would be shown in villages all over Tanzania. It will explain the low-cost low-tech defence measures (based on the chilli ‘package’) that subsistence farmers can employ to keep elephants from raiding their crops. The intention is to encourage mitigation measures that are being employed in several HEC project areas, to be replicated in places where there is no support from any wildlife project. Some of the money from this donor will also go to supporting Mr Enock Chengullah’s work at TNRF.

Dr Hoare reported on the progress that Tanzania has made at an Africa-wide meeting of the IUCN–AfESG in Nairobi in 2009 and how this country is an important part of the continental initiative on the study and management of HEC.

5 OTHER ROUTINE ACTIVITIES

5.1 Animal Handling

Animal handling is a professional service offered under the research mandate set by TAWIRI and constitutes a routine activity every year. We specialize in immobilizing dangerous or difficult species. Cases done in 2009 classified by purpose were:

- Immobilizations for radio-collar deployment/removal by other projects: (29) [Lion, Hyaena, Wildebeest, Elephant, Wild Dog]
- Immobilizations for removal of wire snares: (19) [Zebra, Giraffe, Elephant, Lion]
- Immobilizations for training purposes: (12) [Lion, Buffalo, Elephant, Baboon, Topi, Hyaena, Impala]
- Immobilizations for translocation: (9) [Elephant]

Immobilizations for other purposes were disease sampling, euthanasia. A few of the above were combined e.g. cases for disease sampling were combined with veterinary training or radio-collar deployment.

The TAWIRI aircraft has proved invaluable for rapid reaction to snare removal cases.

A manuscript was submitted to the South African Journal of Wildlife Research in 2009 entitled: “Comparison of anaesthesia and cost of two immobilization protocols in free-ranging lions” by Robert D. Fyumagwa, Zablon Bugwesa, Donald Mpanduji, Morris Kilewo & Richard Hoare.

5.2 Routine Training Activities

SOKOINE University of Agriculture: the two week annual field practical course for final year BVM students was held as usual. In 2009 21 students attended.

MWEKA College: In 2009 a visual presentation and demonstration of programme’s work was given to certificate and diploma students

PASIANSI: In 2009 a visual presentation and demonstration of programme’s work was shown to trainees.

Foreign students: the veterinary programme’s main visual presentation was given to visiting groups of students from USA and Europe.

5.3 Radio-telemetry in wildlife

We continued our long-standing active involvement with other research projects that use radio-telemetry. A paper appeared in 2009 that outlines the problems and recommendations for the use this technology (Hoare 2007c).

We have been in charge of the technical management and preparation of radio-collars and radio-telemetry equipment for the TAWIRI wild dog research project in Loliondo-NCA. This includes programming release dates for collars being deployed, training related to the best use of radio receiving equipment, and maintaining battery health in undeployed collars. We were part of the team that has deployed the first three wild dog collars in early 2010.

Aerial radio-tracking of elephants, wild dogs and lions was done as a service to other projects in the Serengeti ecosystem, using the TAWIRI aircraft.



OTHER ROUTINE ACTIVITIES
ANIMAL HANDLING - Snare removal

Two cases of snared giraffes were reported on the same day by Grumeti Reserves, within 3km of Fort Ikoma.

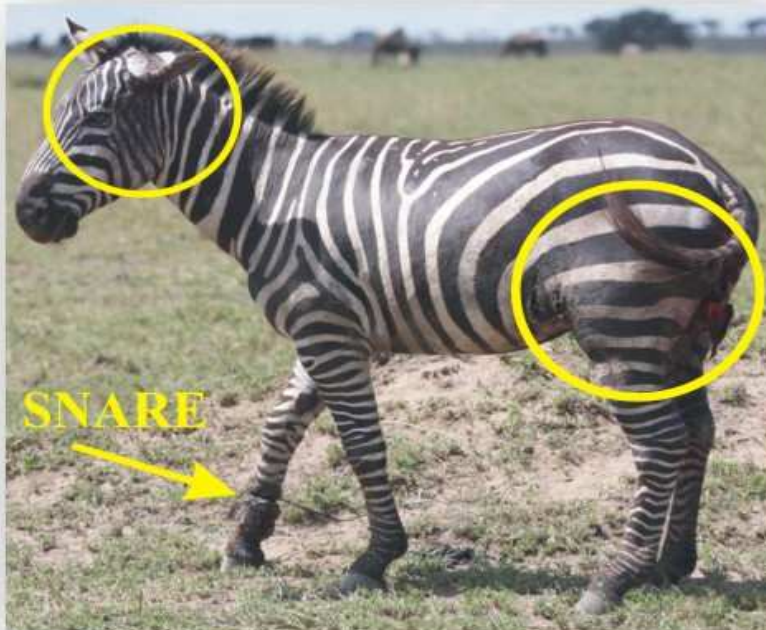
One female (with calf) had a very tight neck snare which was successfully removed.

Less than 500m away was another female, (also with calf) that died after a protracted and painful struggle from a snare specifically set for giraffe in a tree (right). Her calf was unlikely to survive alone.



ANIMAL HANDLING - Snare removal from giraffe

Other cases of adult giraffes, immobilized for removal of neck snares within SNP



ANIMAL HANDLING
- Snare removal from zebra

Zebra snare cases are common. In this distressing case a stallion had also been predated upon whilst alive (above) due to limited mobility because of the snare which had severed the tendon on its foreleg (below).

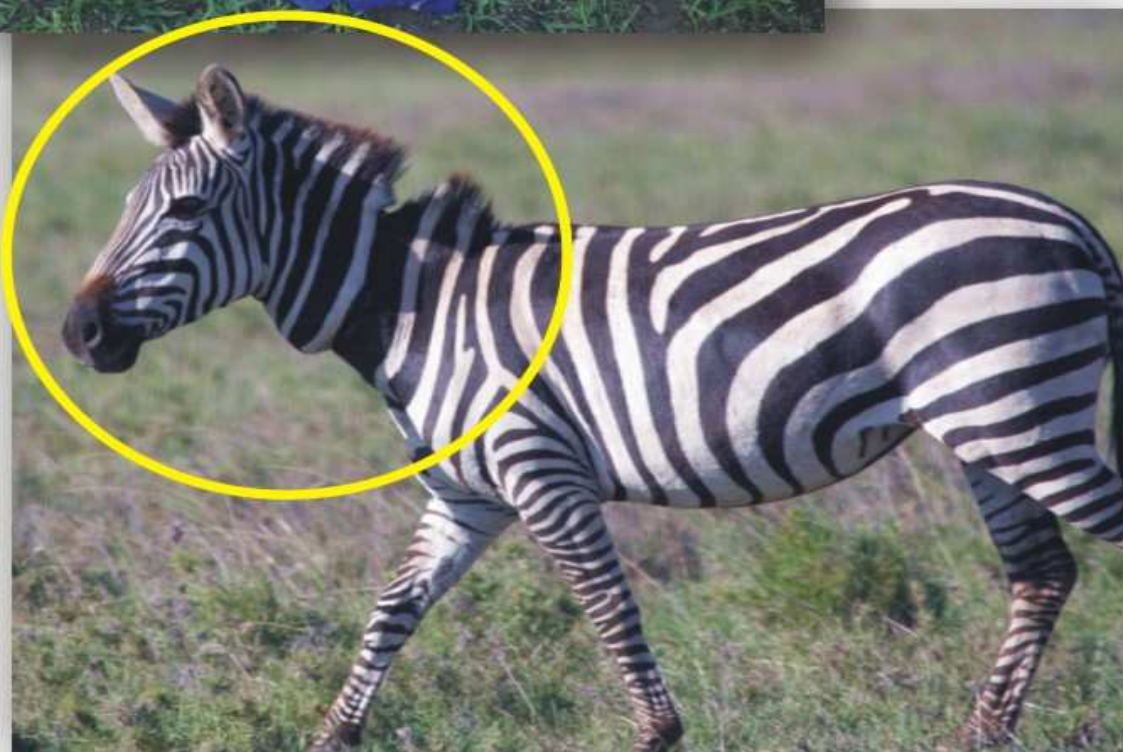
The animal was euthanased.



ANIMAL HANDLING
- Snare removal from zebra

The good news is that even in the cases of severe snare wounds, if treated by the veterinary team the affected animal stands a good chance of recovery.

Recovered animals (below) can be disfigured but otherwise healthy, whereas they would be unlikely to survive at all if left untreated.





ANIMAL HANDLING
- Snare removal from elephants

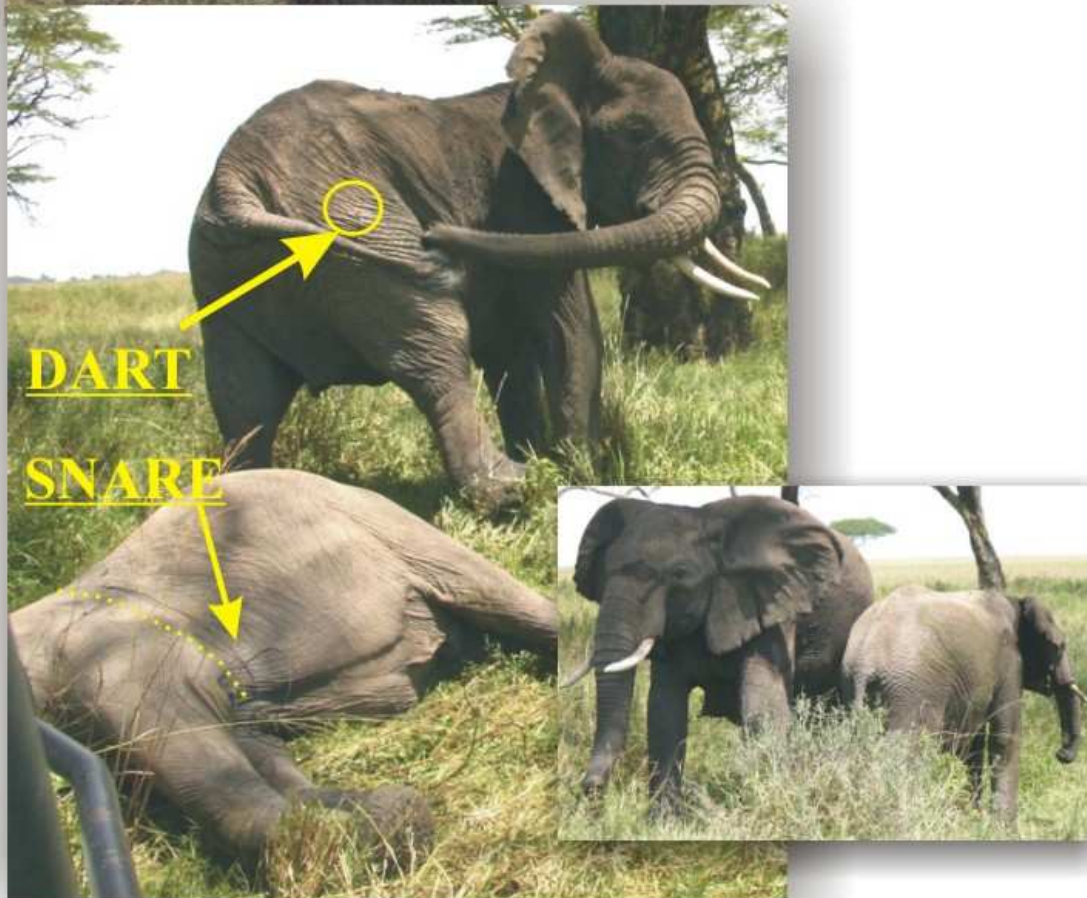
(Top) This elephant calf had severe injury from the poacher's wire severing part of one ear, and cutting through the windpipe.

(Centre)

The cable snare around the midriff of the calf was loose without injury, but still needing removal. Darting calves is tricky for both animals and operators as elephants are very protective, which sometimes means the mother, and sometimes even the herd matriach need to be immobilized as well.

(Below)

Professional handling minimises risks and stress, resulting in a calm recovery.





ANIMAL HANDLING - Snare removal from lions

Indiscriminate poaching with snares even affects key species such as lions. In this case the mane obscured the wound and the snare was no longer present. But intervention for wound treatment is important and is allowed since these injuries are caused by humans.



ANIMAL HANDLING - Translocation

The veterinary team was called to remove and trans-locate a young elephant bull, who had entered the electric fenced rhino enclosure at Grumeti Reserves. Both animals were injuring each other in fights, and efforts to chase the elephant across the lowered fence failed, due to his memory of electric shock.

He was immobilized and treated for injury, then relocated under sedation using a crane truck.



ANIMAL HANDLING Problem Animal -lion

Veterinary assistance was requested by TANAPA to deal with the somewhat amusing but also potentially dangerous situation of a lioness who had shut herself into one of the campsite toilets in SNP -looking for water late at night. Fortunately the situation was resolved satisfactorily, with minimal handling of the stressed and exhausted animal when the door was opened using special tools.



OTHER ROUTINE ACTIVITIES - Training and Educational Activities

The annual SUA veterinary students wildlife practical course is a significant event in each year's programme (above) Tours and presentations are also given to Pasiansi (below), Mweka college and other visiting students and groups, and also to rangers and tour guides when requested by tourism companies or other wildlife stakeholders.



OTHER ROUTINE ACTIVITIES - Radio-Telometry in wildlife

Some faulty radio collars were removed and replaced for an elephant research project (top).

Radio-tracking flights using the TAWIRI aircraft were done for wild dog, lion and elephant research projects (bottom).

5.4 Animal Census

Two aerial censuses of Giraffe were flown using the TAWIRI aircraft in Serengeti National Park, as a service for another research project.

5.5 Publicity Initiatives

A two page information leaflet about the wildlife veterinary programme was compiled and produced in colour and printed commercially in bulk. The publicity section at TAWIRI was given the digital graphics that could act as a template for publicity material in other research projects.

Our snare removal leaflet continues to be distributed. It has definitely started to create more awareness, as reflected in the slowly rising number of animal snare victims reported, and thus treated. We continue to contact selected tourist operators who have lodges and resident guides, and present our material to them. This publicizes the relevance of research and increases vigilance in reporting suspicious wildlife deaths or snared animal cases.

The President of Tanzania again visited Serengeti for his Christmas break. When he did so this year he requested some talks on wildlife research topics. Diseases involving wildlife (by Dr Bugwesa Zablon) and the human-elephant conflict project in West Serengeti (by TAWIRI researcher Mr L. Malugu) were among the topics presented.

5.6 Miscellaneous (Disease)

An incident of high mortality in Wildebeest (170 animals) was due to drowning while crossing a small river in Serengeti.

High worm egg counts were again occasionally seen in sick zebra, sampled via faeces.

We maintain TANAPA's tsetse control targets around SWRC.

5.7 Administration

The programme operates under a Memorandum of Understanding between the two partner institutions which was renewed in 2008, and annual reports are always produced and circulated to all interested parties in Tanzania and abroad. The 2008 report has been circulated in 2009.

In 2009 a visit by three members of the board of the Messerli Foundation Switzerland was made to Tanzania. This was their first visit to the country for 10 years (since the veterinary laboratory was officially inaugurated in 1999). They first met with TAWIRI management in Arusha and then passed through NCA to see the site for Dr Fyumagwa's tick research project. Senior members of TAWIRI management then came to SWRC to have meetings with the Messerli Foundation and to inaugurate the 20-bed student hostel accommodation, for which Dr Fyumagwa organized the refurbishment, using a substantial donation of funds from the Messerli Foundation.

Meetings between the parties were minuted and sent to both. I have produced new outputs as a direct result of these meetings, for approval by the parties e.g. :

- (i) A work-plan for submission to both the Messerli Foundation and TAWIRI, to include expanding wildlife disease surveillance to many previously neglected areas of Tanzania (e.g. ecosystems in the south and west).
- (ii) A protocol to be agreed between the parties for management of the wildlife sample bank, in particular the release of archive samples to other researchers, both locally and overseas.

With regard to new equipment and infrastructure the Messerli Foundation have requested an 'investment list' for their approval to fund in the veterinary programme in the next few years. The most immediate that have already been actioned in 2010 are:

- (i) Purchase of a new 12 volt freezer to expand storage capacity of the wildlife sample bank. .
- (ii) Purchase of material to re-roof the entire veterinary laboratory building at SWRC.



OTHER ROUTINE ACTIVITIES - Administration - Messerli Visit

Three members of the Messerli Board, (Vice chairman Dr Schweizer, Professor Lutz and Dr Faessler) paid a welcome visit to the veterinary programme in Serengeti in October 2009. With senior management staff of TAWIRI at the inauguration of the student hostel, for which the Messerli Foundation paid for refurbishment (above), and at a lion immobilization in the field (below).

6 SUMMARY DISCUSSION

The TAWIRI wildlife veterinary programme has completed another successful year. The portfolio of research on wildlife disease has made steady progress and we have continued to make important contributions to the gradual understanding of these complex conditions. Our applied research continues to benefit the management of protected areas, for example (i) through control of tick-borne disease in the Ngorongoro Crater; (ii) by improved Rabies diagnosis (iii) by disseminating knowledge to overcome common misconceptions about Anthrax.

Human-elephant conflict work is starting to really contribute to mitigating this serious problem countrywide and the chance to review the prevailing situation and provide HEC management recommendations in the forthcoming national elephant management plan is a significant step to assist the government.

Our outputs at the scientific and popular level are being sustained and the training and publicity programme is following a path that exposes both professionals, students and the wider public to valuable new experiences.

Routine activities like animal capture and use of the TAWIRI aircraft continue to provide valuable support to other research or conservation projects. The use of the aircraft within this programme and supporting others was the subject of a separate report submitted to the Director-General in 2009.

This year's visit by the Messerli Foundation was especially significant and valuable. The Messerli Foundation continues its diverse support to TAWIRI: core funding this programme, with infrastructure at the SWRC, and a donation towards the bi-annual conference.

7 FUTURE PLANS

Our programme will continue to pursue the long-term and routine activities as classified and described. In future disease research we aim for the following:

- Further investigation of tick-borne pathogens found in previously sampled carnivores in NCA is planned.
- We hope to move towards typing the *Brucella* strain in wildlife and further understanding of livestock-wildlife transmission dynamics of Brucellosis.
- Opportunities for imminent formal studies will greatly assist us in very necessary disease research: Dr Bugwesa Zablon has secured a PhD level position in a research programme on TB under SACIDS / MUHAS; and Dr Robert Fyumagwa will hopefully obtain resources from Africa One to expand investigations into epidemiology of the important and elusive RVF virus.
- We hope to play a major role in the expansion of FMD virus via collaborative research in the coming years.
- Our new rapid testing service should be a major step forward in Rabies diagnosis and control.
- A 'generic' document on Anthrax outbreaks and control in wildlife environments should be valuable to personnel in the wildlife sector.
- We will try our best to expand disease surveillance to the so-far neglected protected areas of southern and western Tanzania.
- The sample bank will continue to be vital for disease research and we will continue to add to the valuable collection. We look forward to achieving an agreed protocol for the release and use of samples.

With HEC study and management work there is a proposal to consolidate all research initiatives in 2010 into a national forum on HEC that will guide the process of assisting both government and affected communities. If the data collected and work that has been done can have direct bearing on government policy through this forum and the TNRF co-ordinator, we in the veterinary programme will be achieving our objective as a major player in this important subject.

REFERENCES AND PUBLICATIONS OF THE VETERINARY PROGRAMME 2004-2009

(Names of authors from the veterinary programme in these publications are in bold)

- Auty, Harriet., Alison Mundy, **Robert D. Fyumagwa**, Kim Picozzi, Susan Welburn and **Richard Hoare** (2008) **Health management of horses under high challenge from trypanosomes: a case study from Serengeti, Tanzania.** *Veterinary Parasitology* 154: 233 -241 doi:10.1016/j.vetpar.2008.02.034
- Borchers, Kerstin., Dietmar Lieckfeldt, Arne Ludwig, Hideto Fukushi, George Allen, **Robert Fyumagwa** and **Richard Hoare** (2008) **Detection of Equid herpesvirus 9 DNA in the trigeminal ganglia of a Burchell's zebra from the Serengeti Ecosystem.** *Journal of Veterinary Medical Science* 70(12):1377-1381.
- Borchers, K. **Wiik**, H. Frölich, K. Ludwig, H. and East, M.L. (2005). **Antibodies against equine herpesviruses and equine arteritis virus in Burchell's zebras (*Equus burchelli*) from the Serengeti ecosystem.** *Journal of Wildlife Diseases* 41: 80-86
- Dublin H.T. & **Hoare R. E.** (2004) **Searching for Solutions: an integrated approach to understanding and mitigating human-elephant conflict in Africa.** *Human Dimensions of Wildlife* 9: 271-278.
- Fyumagwa, Robert D.**, Pascale Simmler, Marina L. Meli, **Richard Hoare**, Regina Hofmann-Lehmann and Hans Lutz (2008a) **Prevalence of *Anaplasma marginale* in different tick species from Ngorongoro Crater, Tanzania.** *Veterinary Parasitology* doi:10.1016/j.vetpar.2008.12.018
- Fyumagwa, Robert D.**, Pascale Simmler, Barbara Willi, Marina L. Meli, Armin Sutter, **Richard Hoare**, Gottfried Dasen, Regina Hofmann-Lehmann, Hans Lutz (2008b). **Molecular detection of haemotropic mycoplasmas in *Rhipicephalus sanguineus* tick species collected on lions (*Panthera leo*) from Ngorongoro Crater, Tanzania.** *South African Journal of Wildlife Research*, Vol 38(2):117-122.
- Fyumagwa, Robert D.**, Victor Runyoro, Ivan G. Horak and **Richard Hoare** (2007a) **Ecology and control of ticks as disease vectors in wildlife of the Ngorongoro crater, Tanzania** *South African Journal of Wildlife Research*, Vol. 37(1):79-90.
- Fyumagwa, Robert D.**, Donald G. Mpanduji, Robinson H. Mdegela, Samson S. Mkumbo, Athanas Nyaki, **Richard Hoare**, Zablon Bugwesa and Stephen Pflugmacher (2007b) **Detection Of Cyanobacterial Toxins in Tissues of Lesser Flamingo from Empakaai Crater, Lake Manyara, and Lake Natron in northern Tanzania.** Proceedings of the 6th TAWIRI scientific conference, AICC Arusha. pp.277-287
- Fyumagwa, R. D.**, Wambura, P.N., Mellau, L.S.B., and **Hoare, R.** (2007c) **Seroprevalence of *Brucella abortus* in buffalo and wildebeest in the Serengeti ecosystem: a preliminary result.** Proceedings of the 3rd Wildlife Disease Association Meeting, Kasese, Uganda.
- Fyumagwa, R. D.**, Makumbo, S. and Morkel, P. (2004). **Remote treatment of black rhinoceros against babesiosis in Ngorongoro crater, Tanzania.** *Pachyderm* 37: 80- 85.
- Hoare , R. E.** (2007a) **Vertically integrated human-elephant conflict management system in Tanzania : background and next steps.** IUCN African Elephant Specialist Group, P O Box 68200 Nairobi 00200 Kenya. <http://www.iucn.org/themes/ssc/sgs/afesq/hec/pdfs/heccstzvertint.pdf>

- Hoare R. E.** (2007b) **New developments in the research and management of human-elephant conflict in Africa.** In: Proceedings of a symposium on Mitigating Human-Elephant Conflict: Case Studies from Africa and Asia. Editors Matt Walpole & Matthew Linkie (Eds) Fauna and Flora International, Cambridge, UK. ISBN: 9781903703267. (Meeting in Nairobi, Kenya 2006)
- Hoare, Richard.** (2007c) **The Effective And Ethical Use of Radio-Telemetry In Wildlife Research In Tanzania** Proceedings of the 6th TAWIRI Scientific Conference, 3-6 December 2007, AICC Arusha. pp. 484-487
- Hoare, R.,** and Foggin, C.M. (2006) **Legal considerations in the use of immobilizing drugs: an overview 2006** In: Chemical and Physical Restraint of Wild Animals: A training and field manual for African species Zimbabwe Veterinary Association Wildlife Group and International Wildlife Veterinary Services (Africa) Course Manual. (Eds. M.D. Kock, D. Meltzer and R. Burroughs). ISBN 0-620-358-11-4.
<http://www.wildlifecaptureafrica.com>
- Lembo, Tiziana., Katie Hampson*, Daniel T. Haydon, Meggan Craft, Andy Dobson, Jonathan Dushoff, Ernest Eblate, **Richard Hoare**, Magai Kaare, Titus Mlengeya, Christine Mentzel and Sarah Cleaveland (2008). **Exploring reservoir dynamics: a case study of rabies in the Serengeti ecosystem.** Journal of Applied Ecology 45:1246-1257. doi:10.1111/j.1365-2664.2008.01468.x *These authors contributed equally and were awarded the Southwood Prize for the best paper by the Journal of Applied Ecology (British Ecological Society).
- Malima, C., **Hoare, R.** and Blanc J. J. (2005) **Systematic recording of human-elephant conflict: a case study in south-eastern Tanzania.** Pachyderm 38: 29-38.
- Parker G.E., Osborn, F.V., **Hoare R.E.** and Niskanen, L.S. (Eds.) (2007a): **Human-Elephant Conflict Mitigation: A Training Course for Community-Based Approaches in Africa.** Trainer's Manual. Elephant Pepper Development Trust, Livingstone, Zambia and IUCN/SSC AfESG, Nairobi, Kenya.
<http://www.iucn.org/themes/ssc/sqs/afesg/hec/hecreviews.html>
- Parker G.E., Osborn, F.V., **Hoare R.E.** and Niskanen, L.S. (Eds.) (2007b): **Human-Elephant Conflict Mitigation: A Training Course for Community-Based Approaches in Africa.** Participant's Manual. Elephant Pepper Development Trust, Livingstone, Zambia and IUCN/SSC AfESG, Nairobi, Kenya.
<http://www.iucn.org/themes/ssc/sqs/afesg/hec/hecreviews.html>
- Publications referred to outside the programme
- Godfroid, J. (2002). **Brucellosis in wildlife.** Scientific and Technical Review of the Office Internationale des Epizooties 21(2):277-286. <http://www.oie.int>
- Nijhof, A. M., Penzhorn, B. L., Lynen, G., Mollé, J. O., Morkel, P., Bekker, C. P. J., and Jongejan, F. (2003). **Babesia bicornis sp. Nov. and Theileria bicornis sp. Nov.: Tick-borne parasites associated with mortality in the black Rhinoceros (Diceros bicornis).** Journal of Clinical Microbiology. 41(5): 2249-2254.

ACKNOWLEDGEMENTS

Mrs Herta Messerli, President of the Messerli Foundation, Dr Heinz Schweizer, the Vice President, and the members of the Messerli Foundation Board of Directors have been the most important supporters of this programme through their willingness to make available the necessary financial support for all its activities over a very long period of time. We especially thank Dr Heinz Schweizer, Prof Hans Lutz and Dr Ueli Fassler for their time and energy during their visit to the veterinary programme and TAWIRI in 2009.

Within Tanzania, we express our gratitude to the following: Minister for Natural Resources & Tourism, the Hon. the Hon. Shamsa Mwangunga(MP); the former Director of Tanzania National Parks, Mr Gerald Bigurube and his staff; the Director of Wildlife Mr Erasmus Tarimo and his staff in the Wildlife Division; the Chief Park Wardens of Serengeti National Park, Mr Martin Loibooki and Mr Mtango Mtahiko and their staff; the Acting Chief Conservator of Ngorongoro Conservation Area Authority, Mr Bernard Mrunya and his staff members,

We sincerely thank the following people from TAWIRI for assistance in very many ways during the year: the Director-General Dr Simon Mduma; the Director of Research, Dr Julius Keyyu; Dr Victor Kakengi; Dr Maurus Msuha, Mr Fanuel Nnko, Director of SWRC Dr Robert Fyumagwa, Mr Lucas Malugu, Angela Mwakatobe, Habiba Mkwizu, Esther Makacha, Kezia Oola, Silas and all their colleagues in the Tanzania Wildlife Research Institute; SWRC Staff Eunice Kubhena, Teddy Assay, Onesmo Mwakabejela, Juma Msani and Mariki Rediano.

Valuable veterinary assistance was provided by collaboration with the Ministry of Livestock Development and Fisheries through: Dr G. Mwakasungula of the Animal Health Department (Zoo-sanitary section), Dr Yongolo and the staff of the CVL; the staff of the VIC Arusha, and the veterinary officer and field livestock officers in Serengeti and Bunda districts.

We thank our colleagues at the Sokoine University of Agriculture, the Dean Prof Philemon Wambura and his staff, Dr Donald Mpanduji, Prof Elliott Phiri, Prof Lesikit Mellau for collaboration on student training activities.

Those who have professionally collaborated with us from outside the country include: Dr Kristin Harper of Emory University, USA; Dr Kerstin Borchers of the Free University, Berlin, Germany; Dr Sarah Cleaveland, Dr Tiziana Lembo, Dr Harriet Auty, and Dr Katie Hampson of the University of Glasgow, UK; Dr Julian Fennessey, Ms Diane Skinner (AfESG) and Dr Richard Bishop (ILRI) in Kenya; Prof Craig Packer in the USA; Prof Tony Sinclair and Prof John Fryxell in Canada; Dr Roy Bengis in South Africa; Dr Richard Kock in the UK and Drs Gallardo Frontaura and Arias Marisa (CISA) Spain.

We express thanks to those in Tanzania who have assisted in our fieldwork, provided samples or given practical assistance in various ways: Dr Morris Kilewo of TANAPA veterinary unit; Serengeti researchers Dr Ernest Eblate, Emmanuel Masenga, Emilian Mng'ong'o, Ingela Jansson, Patrik Jigsved, John Stewart, Anna Estes, John Bukombe, Ally Nkwabi, John Mcheto, Joseph Masoy, Elias Kalumbwa; FZS staff Dr Markus Borner, Dr Chris Schelten, Dr Karen Laurenson, Alastair Nelson and Felix Borner; Alfred Kikoti and his staff from the Kilimanjaro Elephant Research Project and Keith Roberts and staff from Friedkin Conservation Fund. For valuable professional interactions we also thank Dr Charles Foley of WCS Tanzania Program; Dr Nick de Souza and Dr Alex Chang'a of WSPA and Dr Andrew Williams and Mr Enock Chengullah of TNRF.

Thanks are also due to Brian Harris, Barbara Schachenmann-Suter and Sue van Rensburg of Grumeti Fund as well as Alison Mundy, Martin Dodwell, Glenton Combes and Humphrey Carter of Singita-Grumeti Reserves Ltd. for varied assistance and collaboration.

In Arusha town we commend our extremely efficient administrative agent Mr Baptisita Filipatali for invaluable service and assistance. We also sincerely thank Clive Jones of Power Providers Ltd, the staff of Outpost Lodge, the staff of Arusha Freight Agency, the staff of KwikPrint Ltd especially Tazim Lakharny; Paul and Fini Strebel of Agro-Ventures Ltd; Alex Righolt and his staff at A&A Computers Ltd; Pharmacists Mr H.B. Shakir and Mr Gulamabbas Mohamedali; Dr M. H. Sheriff of Ithnasheri Charitable Hospital and taxi driver Iddi Kido and builder Mr Willy Kanza. Mr Elibariki Mollel of Wakulima Engineering Ltd, Arusha and the staff of the SWRC garage are acknowledged for quality repair work on our vehicles.

In Nairobi we owe sincere thanks to the numerous staff of the Aero Club of East Africa and Phoenix Aviation Ltd who were always on hand to greatly facilitate our necessary administrative visits to Kenya.

Finally, Sian Brown's large and invaluable contribution to the veterinary programme is very sincerely acknowledged, in particular her work in the following areas: maintaining a continual and archived photographic record of all activities; graphic design assistance with illustrated presentations, reports, CDs, maps and T shirts; organizing the printing of this report; plus much assistance with fieldwork, travel logistics, special events, visitors and general administration - the latter especially in 2009 for her role in facilitating the smooth running of the visit by Messerli Foundation board members.

There are many people to acknowledge so we apologize if anyone has been forgotten, and ask that they bring this to our attention.



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