Biosearch Nyika

Scientific Exploration

of the
Nyika National Park,

Malawi,
Central Africa

2006

Edited by C. P. & M. J. Overton

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FOREWORD

This expedition introduced a change from the recent past, in both policy and practise. For the first time since 1997 I personally took on the leadership of the expedition and Marianne Overton took direct control of the field science throughout the month. We also retained our safari bus and driver for the whole period and set up bases in four different areas rather than having one fixed base camp. The change proved to be almost entirely beneficial. It helped to create a good structure to the team and the programme. It also enabled a better focus on the job and good momentum to be maintained throughout our stay. The team of eight from the UK, with two Malawians and supported by up to four scouts, worked well together and everyone pulled their weight, with no extra baggage being taken into the field, in any sense of the word. Our bases were near Zungwara (as in 2005), Fingira, at Juniper Forest and the Upper Wovwe River on the eastern escarpment.

We were very fortunate, in the first few days of our visit, to have some cloud cover to make the acclimatisation process easier. Even in the cool conditions at 7000 ft in July, with the maximum temperature usually around 18-20 degrees, it does get very hot in the midday sun. Careful attention was given this year to avoid heat stress and to build up fitness gradually. Being able to work in the forests and woodlands helped to reduce unnecessary exposure. In this we were largely successful and the good health of the team in the bush undoubtedly contributed to the success of the whole expedition.

After ten years of exploration in the remoter parts of the Nyika National Park, 2006 was most encouraging on two fronts. Firstly, in the areas we covered, we found few signs of recent poaching. The result of this was seen in the Zungwara area, where an abundance of game, including young animals, was exceptional compared with previous years. We are now in a good position to encourage future assistance with some recent photographs of the larger mammals. Although the Biosearch Nyika work is not a safari operation, it does make a big difference to actually see the game we are tracking! We can but hope that this rather optimistic scenario on the plateau will spread to the heavily poached areas in the northern hill zone, where we have spent so much time in the past. The area north of Jalawi and Nganda creates a greater challenge for patrolling, but since it represents a warmer and drier part of the Park, it plays an important role in maximising the variety, interest of the landscape and wildlife of the whole National Park.

Eland crêche *Michael Overton*

Cooperation with the Millenium Seed Bank Project in Mulanje enabled us to support two botanists in the field. We were happy to be joined again by Hassam Patel, a stalwart of our expeditions over the years. We were also joined by

Humphrey Chapama, who became a popular team member and was well able to tackle the difficult terrain, with the assistance of a stout stick, which came to the assistance of the team on more than one occasion.

Elephant at Vwase Marsh

It was necessary to get one of the team members back to Mzuzu for an early flight back to the U.K. for her degree award ceremony. This gave us an opportunity to call in at Vwase for a night. This hot low-lying area has great potential for game and wildlife studies and we hope to include it in future. It forms an interesting contrast to the cool conditions of the high Nyika, with its heavy early morning dews. Calling in at Mzuzu also enabled a restocking from the market with fresh provisions for the scouts in Njalayankhunda, who appreciated the support, especially the fish. We asked Lewis and Humphrey, as Malawians, to do the selection, which I am sure was a good move!

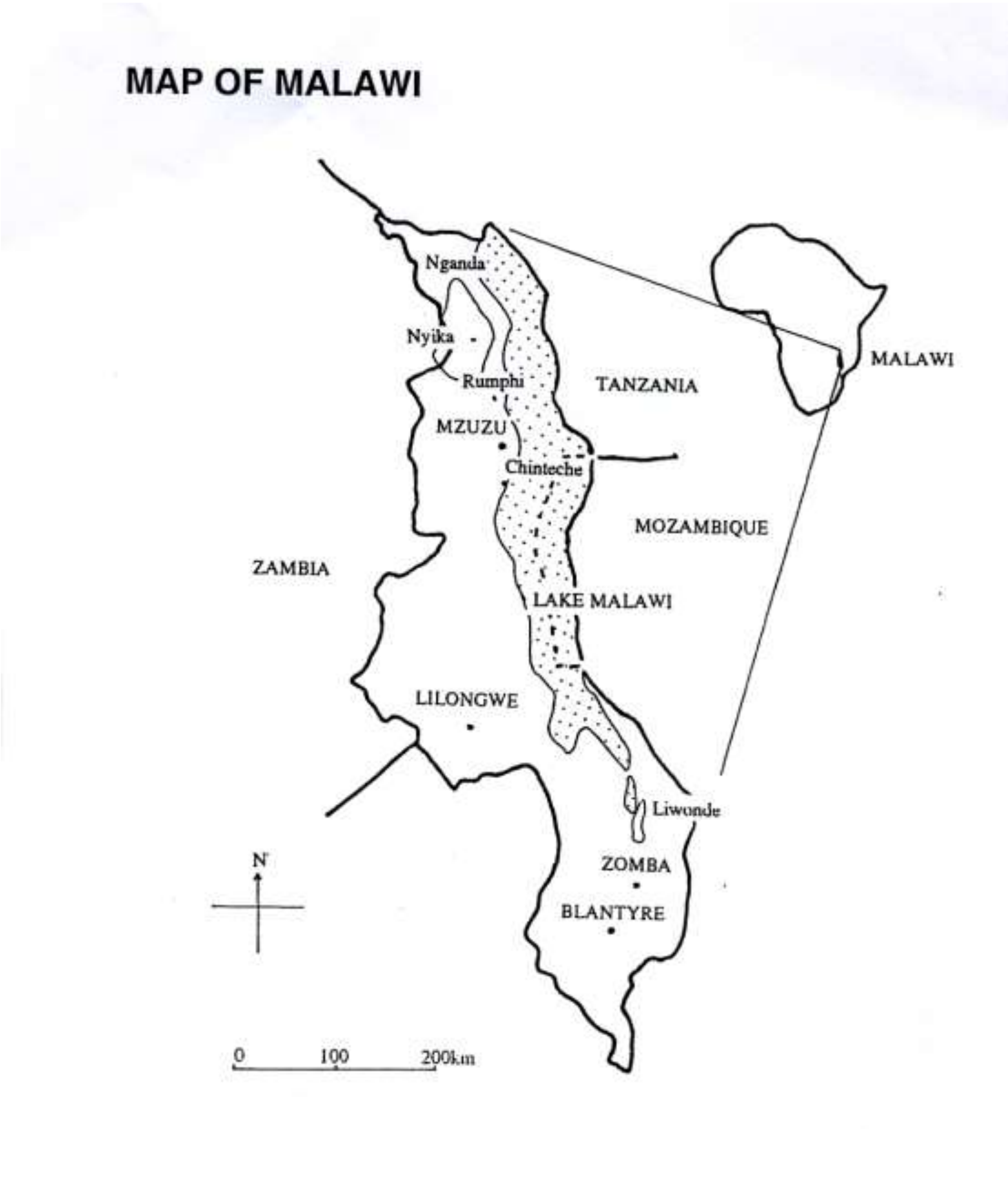
In the final phase of the expedition we walked up the eastern Nyika escarpment, along the route of the Wovwe River. This gives some excellent views of Lake Malawi at times but the terrain is steep, perhaps too steep for much of the game, since Baboons and Bushpigs seem to be the main fauna. We did not have time to go all the way up to the plateau, although given an extra day our team would have happily gone to Nganda Peak and back again. We did, however, travel far enough to decide that the Upper Wovwe is best approached from Chelinda and the North Rumphi river crossing and from there downward to the east. If the North Rumphi Bridge were repaired it would certainly make patrolling in this area much easier and make better penetration by our teams possible from a well-supplied base camp.

The 2006 team is very grateful for the support given to them by Leonard Sefu, Director of the Department of National Parks and Wildlife and in particular the provision by Tommy Mhango and Timothy Maseko of excellent staff to make the project possible. We met them in the Mzuzu office of the Department of Nationa Parks and Wildlife and had a useful closing session prior to our departure for Lake Malawi and Lilongwe. In particular we appreciated the continuity and expertise provided by Lewis Tumbuka throughout our stay in the bush. It was particularly interesting to see the location of his school prior to 1976, now marked by a group of trees in the landscape. Everyone made a great contribution and we have appreciated the opportunity to learn from them and involve them in the scientific studies, which I believe they have found very valuable. Finally and not least, I thank the team who have put in many hours planning for, funding and conducting the expedition. It was a pleasure to lead such a good-natured group who made the job so easy. It is not always like this and they should be congratulated on their professionalism in the sometimes-difficult field conditions.

C. Peter Overton

MALAWI

Landlocked Malawi lies at the southern end of the Great Rift Valley and is bounded by Mozambique, Zambia and Tanzania. It lies between 9° and 17° south of the equator. Its climate may be loosely described as sub-tropical but varies considerably, being much influenced by altitude and Lake Malawi, which forms much of the country's eastern border. The dry season is from May to November. Malawi has a rural economy based on subsistence farming and fishing on the lake but also with large tobacco and tea estates. The country is one of the world's poorest and is slightly smaller than England at 45,747 square miles. It has only four towns of modest size but they are growing rapidly as more of the population migrates from the countryside. The population, living mainly in the the south of the country, is around 11 million. The varied countryside is characterised by a string of high plateau regions from the north to the south of the country and isolated rocky intrusions which conspicuously stick out of the flat landscape.



MAP OF THE NYIKA NATIONAL PARK

Showing the four camps used in 2006

1. **Fingira**
2. **Juniper**
3. **Zungwara**
4. **Wovwe**

THE PROJECT TEAM

Our excellent team of people, included scouts, wildlife officers, young people for whom this was a career move and adults on a first expedition experience. For some the priority was scientific success. Others were seeking challenge and adventure in this Central African wilderness, whilst making a useful contribution to the conservation of wildlife in the host country.

C. PETER OVERTON BSc (Hons)
Project Director of Biosearch. Peter was a member of the Wye College Nyika Expedition (1972) to the northern extension of the Park (as it now is). For the British Trust for Ornithology, he co-ordinates a regional team of voluntary researchers, contributing to national records. He has organised the ten previous Biosearch Nyika expeditions and has long experience in project organisation and management in the UK.

MARIANNE J. OVERTON BSc (Hons) PGCE CBiol MIBiol FRGS
Science co-ordinator. Marianne was raised in East and South Africa and enjoyed leading field research expeditions in the Amazonas, Kenya, Arctic Norway, Yukon, Queensland and a series of expeditions to Malawi with Biosearch Nyika. Each expedition involved a wide range of ecological surveys. She is regional chairman for the Institute of Biology in the U.K.

LAURA MILLER BSc (Hons) Assistant Leader
Laura, from Northampton, has just graduated from Nottingham University with a 2(1) in Environmental Science. An experieiced field biologist, Laura cut her Nyika teeth on the 2004 Biosearch expedition working up from Uledi onto the ridge between Kawozya and Mpanda.

MICHAEL OVERTON Young herpetologist Michael has been brought up with expeditions, this being his seventh in the Nyika. A keen naturalist, Michael intends to travel in South America studying reptiles.

RICHARD COLLINS
Richard is from Portaferry in Northern Ireland and has just completed his first year reading architecture in Edinburgh. “This was both my first expedition and my first time in Africa, but it will certainly not be my last. As well as the amazing wildlife, I found the challenge and adventure of the extreme and remote environment, together with the spirit of expedition very rewarding. I’m really loving it!”

MICHAEL SCOBIE BSc (Hons)
Michael has just graduated from Leicester University with a BSc in Genetics. "I have interests in conservation and animal behaviour. It is not my first time in Africa but I have never been to Malawi nor on an expedition of his type."

SIMONE GENTNER
Simone has just finished her first year at Nottingham Trent University doing an honours degree in wildlife conservation. Habitat management is her favourite module, so the large mammal survey was very helpful to learn survey techniques. Simone is from Cologne, in Germany, where she previously studied Geology.

JENNA BIRCHALL
Jenna is from Stoke-on-Trent and has completed her second year at Derby University doing an honours degree in Ecology. She has a keen interest in art and wildlife, particularly wildlife conservation, animal behaviour and palaeontology. "This was my first visit to Africa and my first expedition. I've thoroughly enjoyed my time here and it is definitely an experience of a lifetime."

RAY MURPHY FRES
Ray developed an interest in insects from the age of seven. He has travelled extensively in East Africa, South America and Australia. He now devotes his time to studying the insects of Malawi and producing scientific literature in co-operation with specialists in their respective fields.

HASSAM PATEL Parataxonomist
Hassam was brought up in Blantyre and first became a mechanic for five years, then joined ADMAC, buying maize, groundnuts and peas for the shops. In 1966 he met Professor Blodinbins, a Scottish visiting lecturer at Chancellor College and assisted her in the Herbarium. He worked with English botanist Dr. Dick Brummitt for 6 months in Mount Mulanje and 6 months in the Nyika (1970) and later with Van Morris in other parts of Malawi. Hassam first worked with Peter Overton in the Nyika in 1972. Through his work with Biosearch, Hassam became well-known internationally and has been invited to work in Rwanda, Kenya, Japan and America. He is now seconded to the Millennium Seed Commission for three years, based at Mount Mulanje.

HUMPHREY CHAPAMA
Herbarium Assistant
After school in Monkey Bay, Humphrey started his working life as a train driver with Malawi Railways. After two years, he left to work for the Forestry Institute of Malawi and studied for two years at the Malawi College of Forestry. Humphrey was posted to Tanzania to do tree identification (6 months) and to Zambia (3 months) doing vegetation surveys. Humphrey now works with the Millennium Seed Bank, based in Zomba and funded by The Darwin Initiative.

OWEN NG'OMA

Since 1998, Owen has worked with Skyways driving buses occasionally to the Nyika, but never spent a night out in the Park until now. This was a baptism for Owen, a city lad from Lilongwe, who chose to join the expedition in the field exploring the bush and camping in a tent for the fist time.

LEWIS N. TUMBUKA Senior Parks and Wildlife Scout

Lewis went to school in the park near Fingira Rock (and our first base camp) before the area was included in the enlarged park in 1976. He thus has intimate knowledge of our survey area, which proved a great advantage. Lewis worked on the Nyika (8yrs), Kasungu (7yrs), Nkhota kota (1yr), Kasungu (1½yrs) and Vwasa (7yrs), where he is currently working on wildlife monitoring using aerial and roadside counts and transect walks 2km apart. Lewis was interested in using the Biosearch monitoring techniques in other areas.

KENNEDY NGWIRA

Senior Parks and Wildlife Scout. This is Kennedy's 20th year working with the Department of National Parks and Wildlife; eight years at Njalayankhunda, five years at Thazima and seven years at Vwase. Kennedy started at Mzokotofp school to standard 8, then achieved full junior certificate in 2003, whilst working with DNPW and is now studying for his Malawi Schools Certificate of Education, which he aims to complete in 2007. Kennedy is married with five children between the ages of 5 and 25 and is also responsible for his brother's five children since their mother passed away. Kennedy's eldest son is at Miracle College, where he was sent as a boy after Kennedy's first wife passed away.

JONAS LUHANGA Senior Parks and Wildlife Assistant.

Jonas is from the Matupi Traditional Authority, west of Rhumpi District. He started with the Parks Authority at Vwasa in 1986 as a scout, then Lengwe (1988) and Chelinda (1996), when he joined our first Biosearch expedition. In 2002 Jonas went to Njalayankhunda and is now ready to transfer to Thazima to help train new scouts. Jonas was one of three from a Leadership couse at Liwonde who was selected to become a trainer and enjoys his work. "It is natural we love our natural heritage and we protect it. Otherwise it will run out and be gone."

RYLE SADRACK Parks and Wildlife Assistant.
Ryle has come from Mzuzu nature sanctuary, where he was responsible for encouraging conservation education, including visits to the Nyika National Park. Ryle had been in the park for three months at the start of the expedition. He appreciates learning how to run an expedition and learning about the trees and grasses.

ALFRED MKONDA Parks and Wildlife Assistant.
Alfred has been with DNPW for three years

ANDREW KATAYA
Senior Parks and Wildlife Assistant. His first year in the Nyika National Park, having been at Lake Malawi N.P. for four years. During the expedition he much appreciated gaining knowledge on the trees and animals of the Nyika N.P.

Chance meeting in 2006 of some past and present Biosearch team members.

PARKS STAFF & PARTNERS (1996-2006)

Scouts, Wildlife Officers and Research Staff

Chisa Manda
Msida Gondwe
Gibson Mphepo
David Critchlow
Leonard Moio
Alex Chunga
Tommy Mhanga
Timothy Maseko

1996

Bellings Kachali
Jonas Luhanga
Solister Munthali

1997

Manfred Kumwenda
Jonas Luhanga
Solister Munthali
Anwin Mkandawire
Steve Gondwe
Richard Nyirenda
Kenneth Kaonga
Paul Chisambo
Frances Luhanga
Kennedy Chihana
Agrey Chione
Layton Mughogho
Jones Mwalukomo
Catherine Chunga

1998

Steven Gondwe
Manfred Kunwenda
Richard Nyirenda

1999 (2 Expeditions)
Steven Gondwe
Manfred Kumwenda
Richard Nyirenda
Steven Gondwe
Simon Mughogho
Jones Mwalukomo
Muthetho Nlhemin
Grandson Simkoko
Martin Chirwa (cook)

2001
Boston Chilogo
Manfred Kumwenda
Kingfrey Sichinga
Nathan
Anwin Mkandawire
Hetherwyck

2003

Hastings Kauierenga
Boston Chilongo
Manuel Gondwe
Stanley Gondwe
Lawrence Kuchipanga
Luka Mchila
Solister Munthali
Clearance Mwakanand
Richard Nyirenda
Kingfrey Sichinga
Paston Simkoko
Grandson Simkoko
Paul Chisambo
Patson Mukisi

2004

Manuel Gondwe
Lackson Mughogho
Kelvin Munthali
Richard Nyirenda
Kingfrey Sichinga
Grandson Siomkoko

2005

Lewis Mtumbuka
Ben Siwakwe
Chiza Muleje
Henry Mughogho
Richard Nyirenda
Simon Mughogho
Ian Luhanga
Daniel Chavala
Aubry Mpewle
Hetherwick Msiska
George Nxumayo

2006

Lewis Mtumbuka
Kennedy Ngwira
Jonas Luhanga
Ryle Sadrack
Alfred Nkonda
Andrew Kataya

INTERNATIONAL EXPEDITION TEAMS 1996-2006

1996 RECONNOITRE

Dr David Critchlow, leader
Peter Overton
Marianne Overton
Michael Overton
Bellings Kachali
Solister Munthali
Jonas Luhanga

1997

Peter Overton, Leader
Prof Hynek Burda
Jana Burda
Wilbert Chitaukali
Lucy Creegan
Amelia Jarman
Jens Hogaard
Ian Henderson
Simon Husson
Nigel Lowthrop
Hilary Ludlow
Andy Mitchell
Ray Murphy
Marianne Overton
Michael Overton
Hassam Patel
Mathew Pink
Dr Alex Ramsden
Katie Reed
Jane Scott
Lyn Wells

1998

Capt.Chris Nagle, Leader
Capt. Ken Tembo
Richard Hathaway
Peter Beaumont
Claudia Figg
Steve Mayes
Morgan Beanland
Adele Chuck
Gemma Sayer
Jeremy Osborne
Will Taylor
Vicki Bain
Anne Smith
Mark Davis
Oliver Stead
Hassam Patel
Wilbert Chitaukali
Ray Murphy

1999 JULY

Rohid Sharma, Leader
Struat Bertram
Tom Booker
John Brammall
Richard Carter
Edwin Croxton
Dominic Gallea
Jullianna Hughes
Dave Longden
Richard Jackson
Simon Morford
Leslie Mitchel
Verity Irvine
James Robb
Peter Shuttleworth
Benet Swann
Michael Willis
Christine Whiteside

1999 SEPTEMBER

Monty Halls, Leader
Mary-Anne Bartlett
David Bowden
Dr Mark Bilsland
Dr Kit Cottrell
Dr Sarah Donovan
Dr Rod Lindenbaum
Tooni Mahto
Andy Martin
Raymond Murphy
Hassam I Patel
Philip Watson (Vet) FRCVS
Claire Wells

2001

Mike Lainis, Leader
Alexis Brun
Mark Gilroy
James Iles
Samantha Iles
Lianne Lewis
Beverley Mason
Carla Mayhew
Hassam Patel
Emma Powsey
Paul Robertson
Helena Skinn
Nikki Vohra-Beulens
Penelope Whitehorn

2003 APRIL

Quincy Connell, Leader
Lovemore Mazibuko
Hassam Patel
Wilbert Chitaukali
Jonathon Easton
Karl Egan
Sarah Lightman
Rachel Olson
Katie Storey
Catherine Tabor

2003 JULY

Quincy Connell, Leader
Hassam Patel
Raymond Murphy
Robert Singini
Penelope Whitehorn
Karim Vahed
Timothy Cheeseman
Jennifer Clark
Lorraine Hall
Sarah Barber
Kirsty Bell
Maria-Ana Borges
George Busby
David Clarke
Alastair Herd
Christina Stranescue
Victoria Collins
Emily Fereday
Emma Greetham
Peter Overton
Marianne Overton
Michael Overton

2004

Quincy Connell, Leader
Hassam Patel
Kefa Kaunda
Robert Singini
Stacey Batt
Natalie Benson
Andrew Bourne
Donna Cleal
Laura Miller
Roxanne Magee
Rebecca Moore
Chris Neal
Kelly Osborne
Sian Phillips
Aidan Piercy
Catherine Tabor
Joanna Walker

2005

Quincy Connell, Leader
Peter Overton
Marianne Overton
Michael Overton
Lorraine Hall
Christine Stranescue
Alisdair Dawes
Emma Strong
Mareike Ceasar
Brenda Hole
Hannah Linington
Karen Pardoe
Andrew Pringle

2006

Peter Overton, Leader
Marianne Overton
Michael Overton
Laura Miller
Richard Collins
Simone Gentner
Jenna Birchall
Michael Scobie
Hassam Patel
Humphrey Chapama
Owen Ng'oma

LEADER REPORT

C Peter Overton Expedition Leader

THE CHALLENGE

Our challenge was to get our multinational team to a remote area of African bush, to live and work safely and produce valuable data for the production of the report and for the use of the Department of National Parks and Wildlife in Malawi. The team wanted to achieve a successful expedition and contribute something useful to their host country. This 2006 team was highly successful in every respect

PRE-EXPEDITION PLANNING

It was great that a member of our 2004 Expedition (the tough expedition), Laura Miller, joined us as Assistant Leader. She had time in Lilongwe prior to the arrival of the team, with full briefing notes and a checklist of purchases. Some of the accessory items, which have always taken a disproportionate amount of time in locating around town, were brought from England and will be stored in Mzuzu ahead of the arrival of the next team. With the assistance of the Director of National Parks and Wildlife, we hope our permits will be supplied in advance next time. Food rations on this expedition were generally considered to be good. This was achieved by greater use of local fresh produce, careful menu planning and subsequent reduction in tinned and convenience food. We envisage a continuation in future years of better diets all round, including the ability to support our excellent scouts with supplementary rations over and above their basic provisions.

INTERNATIONAL TRAVEL AND ARRIVAL OF THE TEAM

Five members of the small team arrived at least 48 hours in advance of our departure to Nyika National Park. Where time is not critical to team members there is some advantage to early arrival, to allow recovery from the tiring international travel that precedes the expedition. This year we had no problems with loss of baggage, which was a considerable relief following problems in the past. We advised team members to keep essential camp items with them as hand luggage (principally their sleeping bag). The main routes into Lilongwe are via Johannesburg and Nairobi and both of these flights arrive conveniently at around the middle of the day. We have not yet had problems with delayed flights since both routes have long transfer periods at their respective hub airports and involve similar flight times into Lilongwe. The scheduling of Kenya Airways on the return trip to UK is highly unsatisfactory, involving an eight-hour wait in Nairobi airport; one of the least pleasant stopovers, with generally poor facilities. For this reason we are now recommending that team members opt for the Johannesburg route, although total journey time is little different.

TRANSPORT

Our 24-seater coach, ably driven by Owen Ng'oma, who had driven the team to the Nyika in 2005, provided sufficient capacity to carry all our bags and provisions and could probably have taken another two team members if necessary, so the use of a trailer was avoided. However, we do need to allow for other personnel, principally the scouts, when we get to Thazima. On the return trip extra seating capacity becomes available as provisions are used up and scouts depart, so there was plenty of space. It is still advised to allow at least one and half seats per expedition member to make sure that baggage and people are well separated on the trip back. Unfortunately, baggage is like water and tends to spill everywhere during a trip, assisted by team members' natural desire to access it at frequent intervals. It is very difficult to contain it within its theoretical space requirement.

THE FIRST STAGE – TRAVEL TO MZUZU

As always, we started off with lunch of filled fresh buns. Within an hour of leaving the plane everyone is well ready for something to eat and it saves precious time if we are prepared before departure. There really is not sufficient time to stop on the way more than once and still get to Kasito Lodge before dark. We had got only as far as Kasungu filling station when we had problems with our transport. It appeared to be a poor contact on the battery and we got going again with an hour's delay, following some local assistance. On arrival at Chikangawa we found that a local politician and his friends already occupied Kasito Lodge, with insufficient room for our team. Despite having made the booking some weeks ago and confirmed it very recently through Land and Lake Safaris, the message had not been transmitted from the forestry office in Mzuzu to the staff at the Lodge. This is not the first such occurrence and we feel that the Department of Forestry needs to address the problems with communication urgently, in the interests of both customers and the helpful staff who work there. Fortunately, the other visitors kindly agreed to vacate their rooms and move across to the other lodge, for which we were very grateful. We had come prepared for power cuts but our candles survived the whole expedition, more or less intact, with just limited use at the Chelinda Youth Hostel to assist with cooking there after dark.

We had completed our usual three-hour stop at Mzuzu, where fresh provisions are readily available and replacement chopping boards can be obtained. Next we travelled the 12-km to the home of entomologist Ray Murphy, which is conveniently just off the old road north. We had some insect photos for him to identify, some report work to discuss and field equipment to collect. It was our intention to travel straight on to Thazima afterwards. The bus failed to start. We were eventually able to roll it backwards and kick it into action but it was clear that we needed to sort out the problem properly in Mzuzu before going further, so back to town we headed. Detailed inspection showed that the batteries and terminals were both in poor condition, one of the former visibly leaking and the latter badly corroded. By replacing both we thought we had solved the problem but no such luck. It was clear that the starter motor was also at fault. The bus had to go – and go it did, back to Lilongwe after a replacement had been sent up overnight. This was not the end of the bus repair saga; a repair to springs intervened on two further occasions. Since the driving of Owen was exemplary and great care was taken over rough parts of the road, it seems the springs were not fit for purpose. We recommend that in future high quality replacement springs be installed before further trips to the Nyika with a bus. The ones we inherited had already been repaired and were clearly terminally weakened. Since we hired from a reputable company and paid a substantial sum for the vehicle one might have hoped for better luck. But this is still a developing country and we are well organised with our contingency planning. Vehicles are always a potential headache, which is why we organise our main survey work on foot! The next morning we were able to finally move north.

THE SECOND STAGE – TRAVEL TO FIRST BASE CAMP

We caught up with most of our lost time since, by avoiding a stay at Thazima and staying in the hostel huts at Chelinda, the next occasion when we needed to pitch our tents was at first base camp, on the track to Fingira. We picked up three of our four allocated scouts on the way through Thazima and arrived at Chelinda by 4.30 p.m., too late to proceed further. We spent this first night in the park at the Youth Hostel. Chelinda is one of those places to which you seem to have to go but try to avoid. One way or another it always seems to soak up a disproportionate amount of time, which could be better spent in the bush. Being a tourist centre it provides beer and even food if you pre-book. This can be a mixed blessing in the middle of a tough wilderness expedition. Nevertheless each time we pass, soft drinks and beers seem to take their place in the bus, to be returned or given away to children when empty, for reclaim of the deposit. There are people to be spoken to also. After many years visiting the Nyika it is difficult to pass through without making the time to say hello to well known faces. One such person is Peter Tumbuka, who works at the reception there and whose father worked with Ian Gordon, Park manager when I first visited Nyika on the Wye College 1972 Expedition. Robyn Foot of Nyika Safaris was helpful in suggesting future remote locations for our teams; so much of the Nyika is really never visited and there is much potential for being very remote and seeing no one for weeks. Chelinda also offers the opportunity for horse riding and potentially close approach to Zebra. Our team took this opportunity just before we departed from the plateau for the next phase of our expedition. Meanwhile I took the opportunity to visit Leonard Moio, who was part of our 1997 team and is soon to be posted to Lengwe National Park in the Lower Shire valley in the extreme south of Malawi. A greater contrast to the Nyika is hard to imagine! He strongly advised us to stay away from such a hot place in August. I am sure we shall take his advice.

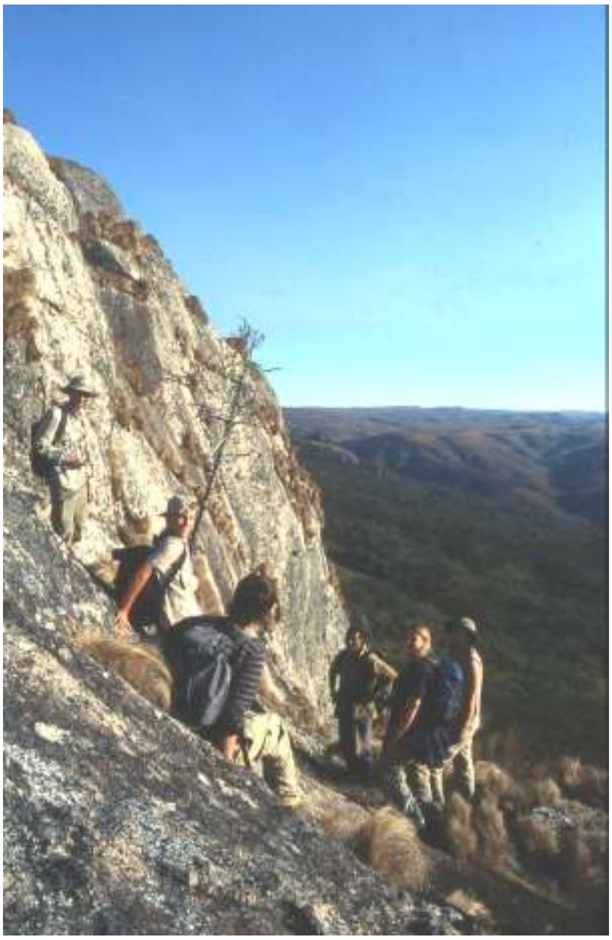
FIRST CAMP NEAR NYAMBWANI ON FINGIRA ROAD SOUTH OF CHELINDA

Six nights: Sunday 9th to Saturday 15 July
Map reference Chelinda 865148 Altitude 6,950’ 10°43.449’S 33°47.553’E

Scouts - Lewis Tumbuka, Alfred Mkonda, Andrew Kataya, Ryle Sadrack

It was quite early in the morning when we settled on an excellent campsite recommended by Lewis Tumbuka and prepared a comfortable base for what was going to be our home for the week. Everyone was pleased to be in the field at last after the trip up to the Nyika. We found a suitable hollow near the stream, with the bus being able to park just 100 m away, enabling easy unloading of provisions. We had brought some planks from Chelinda so had, for the first time since 1997, a flat table on which to prepare food and keep our stores off the ground. Hand held radio gave us contact with the Park system but only after a short climb to the top of the ridge near the bus. Circumstances dictated that we could not return to this camp to dismantle it, as planned at the end of our stay at Juniper Forest. This meant that we could not do our usual thorough inspection job prior to leaving but we did agree with Ryle Sadrack that he would check everything before going back to Chelinda with Owen, the driver. On leaving the park we believe that the table and toilet facilities, at least, were still in place, so we expect that some scouts will enjoy their use at a later date.

Humphrey Chapama joined us from the Millennium Seeds Trust at Mulanje shortly after our arrival. He proved a welcome and good-humoured addition to our team. It was from this camp that we launched out to cover our first plots on the plateau in the Fingira area and also down into the *Brachystegia* woodland. We were very fortunate that our first and second days out were cool and mainly cloudy. This is not uncommon at this time of year and it does assist in the process of acclimatisation of the team to the difficult walking conditions. There are substantial downsides to this late winter period on the Nyika but the climate is not one of them, provided the team has good double-skinned tents. We found night minima of around 5-7 degrees were common with a cold shower down one's neck as you pushed out through the tent entrance in the early morning; heavy dew is the norm. For the first two days we did find ice had formed on the dew on our tents. We questioned the accuracy of our daytime maximum temperatures, since our recording thermometers were screened behind vegetation near the stream and one broke early on. However we did get readings in the low 20's. The intense sun over the middle part of the day belied the relatively low thermometer reading at this altitude of nearly 7000 ft.



The full team did animal plots, assisted by our driver, Owen, who did not wish to be left out of the proceedings. We recorded our findings in individual notebooks and transferred data to the recording sheets at the end of the day. Unfortunately it also became the norm for one or other member of the team to take a tumble down some hole or other or to slip down a steep slope when we approached the rivers. No-one was immune from this indignity but risk of significant injury was always present. Unfortunately on the long trek over to Juniper Forest Laura badly strained a ligament at the back of her knee, which took several days to heal sufficiently for her to be fully back in action. Crossing the ravines and rivers took their toll on the team and necessitated the insertion of an easier day into the programme to follow the tough one. Thoughts of splitting the team were abandoned when it became clear that we were operating well together as a group and covering each plot with a single sweep. We also had the luxury of the bus to take us nearer to some of our squares along the track, thus ensuring better coverage in the first week. Subsequently we were operating away from any road access. We soon set up a routine of prompt morning starts and no time wasting. The odd rest day in the programme is necessary; largely to facilitate washing but this year we maintained a high level of activity from beginning to end, keeping the momentum of the expedition going. As a result of this morale remained high throughout. The highlight for some on this first phase was climbing Fingira Rock at the end of a long day in the field. We were told that none of the scouts climbed the rock. It had been used as a place of refuge during the Ngoni wars and was not a place they wanted to go. Unfortunately, the route chosen was the difficult north face and there were many anxious moments before everyone returned, getting back to camp only just before dark. Subsequently we discovered that approach from the other side, near the cave, would have been much easier.

SECOND CAMP AT JUNIPER FOREST

Three nights: Sunday 16th to Tuesday 18July
Map reference: Muhuju 970115 Altitude 6,850’ 10° 45.085’S 33° 53.258’E

Scouts - Lewis Tumbuka, Alfred Mkonda, Andrew Kataya

The walk to the east, crossing the Chelinda River, from our first base to Juniper Forest, was tough at times and took eight hours, including an hour for lunch. Again the weather conditions were kind with partial cloud assisting the trek. It took an hour to complete the crossing of the river, allowing for searching for a suitable crossing site and then getting the whole team plus bags over without getting either wet. Most of the team enjoyed this part of the challenge but the trail seemed to get longer and longer. This was especially true as we had to fight through a particularly dense patch of *Brachystegia longifolia (above)*, low and obstructive and determined to allow only the passage of a person but not the rucksack and roll mat to follow. This part of the woodland seemed to have a unique personality of its own and was rather unlike anything we had experienced previously.

There was no one who did not give a sigh of relief when finally, after several false dawns, we came across the welcoming sound of the waterfall at Juniper Forest. We had carefully planned our rations, so as to carry as little with us as necessary, otherwise we may have simply put up camp on the route. In the first of our two working days near Juniper we explored the evergreen forest patches, sighting a Blue Monkey, large and genuinely blue, an impressive endangered species. We were also treated to a persistent ‘Chiperone’, with low cloud and drizzle persisting until early afternoon. Laura struggled with her knee and had to spend the next day working nearer to base to give it a rest. On the second day we did some more plateau plots and followed this with a night walk around the forest. We found nightjars but nothing else. All was very quiet but we feel that there should be more night sounds; perhaps the cough of a leopard or the hoot of an owl, both of which we knew to be present.

The next day we started what could have been a very long walk out of Juniper and along the track towards the Kasambara junction. Fortunately we had managed to make radio contact with Chelinda and had got the bus to come round to meet us. It would have been extremely difficult to stick to our original plan and walk back to the first camp. The team, supporting an injured member, was not up to it. In the event we walked several kilometres up the hill, not sure whether Owen would in fact get his bus all the way along the track towards us, since we had been pre-warned that one section was nearly impassable. However, luckily, we underestimated our driver. We were able to watch him through binoculars across the rolling landscape, as he ploughed his bus through a collapsed three hundred-metre section of road, like a great clipper rolling over an Atlantic storm surge. There was a loud cheer, which could have been heard at Chelinda, fifteen miles away, when it became apparent that he had made it against all the odds. The thought then occurred to us that we still had to return along the same section!

We had cut our rations very fine to save weight, so it was a relief when some hours later we passed through Chelinda on our way to our final plateau camp at Zungwara. During a brief stop a crate of drinks found their way onto the bus and into the cold box, each one carefully designated to its owner and agreement on who had ordered what and when.

THIRD CAMP AT ZUNGWARA – Four nights: Wednesday 19 to Saturday 22 July
Map reference 791377 Altitude 6,500'

Scouts – Lewis Tumbuka, Alfred Mkonda, Andrew Kataya, Ryle Sadrack

We had crossed the threshold in terms of personal fitness and acclimatisation and by now the whole team seemed to be working extremely well together and tackling the demanding hiking and camp tasks with ease. At this stage jobs were being done without asking and following an ant attack at the Zungwara camp for the second year running, acceptance of our interdependence, with enforced sharing of tents, was complete. Laura preferred to sleep outside with the ants but sealed herself inside her sleeping bag so she became like a slumbering log and part of the landscape. It took the re-lighting of the morning fire, just inches from her chosen spot, to persuade her to move, prior to the pot-boiling providing the incentive to rise.

The point of revisiting Zungwara was to do replicas of last year's plots and make a comparison. The red ant incident suggested the idea that maybe things would not have changed much from one year to the next! We were vigorously attacked for the second year running and forced to wage systematic warfare with a homemade flame-thrower until we finally left them in peace to regroup - for the next visitors to use this site. We baked bread at this camp and this showed us how this one item can be such a force for good as well as bad: generally good unless someone makes a special honey loaf and it is all eaten by the time they get back from the bush! The moment of tension was short-lived and it is true to say that relations were extremely good throughout this expedition.

TRANSIT CAMP AT VWASE – One night: Sunday 23 July

Scout – Lewis Tumbuka Kasuni Camp

On our way out of the park via Chelinda and Thazima we dropped off our scouts, except Lewis Tumbuka, and picked up Kennedy, who subsequently got off at Bolero and made his way to our final research destination while we spent a night at Vwase. Our bus was struggling again with broken springs at this stage and the last few kilometres to Kasuni camp were painfully slow. However, our eighteen hours at Vwase was well rewarded with wildlife experiences, including removing a Puff Adder from the environs of Simone's tent, which had become known as the palace, because of its large capacity (ideally for people not snakes!). Views of elephant and hippo and the potential for lowland wildlife surveys make this destination a must for our future trips to the Nyika area. The presence of Lewis Tumbuka was again invaluable. He is very familiar with the plateau section of our expedition, having gone to school only a short distance from our first base camp before the removal of the population in 1976. He is now based at Vwase and provided the perfect local guide for our brief stay. The Park management had chosen well for us when designating our scouts and we were very grateful for this excellent support.

A NIGHT IN MZUZU AND ONWARDS TO THE EASTERN ESCARPMENT

It was time for our team to shrink. Laura had gained her degree and was heading back to the UK to attend her graduation ceremony. The bus needed urgent attention before we could go further too. We found accommodation in Mzuzu and enjoyed a meal out together in the evening. There was a power cut to add to the atmosphere; so it was candlelight by necessity rather than choice. Finding the allotted restaurant was a challenge too, since the bus and driver had made up their minds to go in a different direction to the remainder of the team and all the streetlights were out. First thing the next morning we said our goodbyes to Laura. She took the bus back to Lilongwe and had a small adventure of her own when she got there very late in the evening after a long day's drive. We had enough provisions to see us through the remainder of the expedition in the north east of the park but topped up with a few items of fresh food before heading north again along the Lakeshore road. On this route we had the opportunity to take close pictures of troops of Yellow Baboons and Vervet Monkeys as we descended through the cuttings down to the lake, prior to turning off to the scout camp at Njalayankhunda.

TRANSIT CAMP AT NJALAYANKHUNDA – Tuesday 25th and Saturday 29th July
Two nights
Map reference 190459 Altitude 1950'

It was good to be welcomed at the scout camp by Jonas Luhanga, who had assisted with our 1996 visit to the Chipome Valley. That he could join us for this next phase of the expedition, ten years on, was excellent, particularly as he knew the area we were to visit very well. We made a rapid encampment near the river there and were off up the mountain by 6.30 the following morning, determined to beat the heat of the day. Operating at such a low altitude is alien to us. Nobody relished carrying rucksacks once the sun had got up. It was by design our earliest start of the trip.

FOURTH CAMP AT UPPER WOVWE – Three nights: Wednesday 26th to Friday 28th July
Map reference Chilumba 139436 Altitude 4000' 10° 27.742S 34° 02.460'E


Falls on the Wovwe *Richard Collins*

Scouts - Lewis Tumbuka, Jonas Luhanga, Kennedy Ngwira

Our ascent along the dam road was made quite quickly since everyone was now fit and we had again taken minimal provisions for our three nights up the mountain. The final section along a path beyond the dam was tricky in places. There is one section that needs extreme care, as the route hangs above a vertical drop into the Wovwe River, perhaps 100ft below. This part of the park is much damper, with dry season showers being not uncommon. We did in fact experience around half an hour of rain on one morning. The climate shows in the vegetation, which remains quite green, with muddy patches on the path at intervals, where springs pushed their way out of the hillside and with fallen trees on steep terrain. Humphrey had wisely cut himself an excellent stick for support and later this became useful for hacking down dense vegetation near the river, where we eventually pitched our campsite.

The Wovwe is indeed a great river on which to camp, with a large volume of rushing water hurtling over the rapids and waterfalls down the mountain to the east. The water is clean and well aerated and by putting our washings into a sump nearby we made sure that we did not pollute it. It would have been all too easy to neglect this proper environmental management adjacent to such a river. The steepness of this terrain, described by Laurens van der Post, in his book *Venture to the Interior*, meant that during our three days of plot work, slips were common. Fortunately we had no further injuries. When we had finished, there was no doubt in my mind that further investigation of this area should be done by approaching from the plateau to the west. The Upper Wovwe has sufficient water to support a good base camp and we could travel lighter and downhill when first loaded with provisions. Furthermore we found little sign of game in the steep woodlands, except baboons and bushpigs. The former seemed to be more numerous here than elsewhere in our travels in the Nyika National Park. It would seem that abundance of fruiting trees throughout the year might support them better. Some of our team was keen to push on westwards to climb Nganda and return the next day. However, we could not have done this with our remainingprovisions and it would have been necessary to take our tents for a night out at over 7500', making the long trek exceedingly difficult in just two days, which we needed for our surveys. 'Conquest of the peaks' would have to wait for another expedition. This could be done by starting at Uledi and walking along the Mpanda-Kawozya-Nganda ridge, before heading east down the Wovwe for collection at Njalayankhunda. This would avoid the worst of the steep escarpments up hill, whilst being a really challenging walk nevertheless.

Difficult crossing of the River Wovwe *Richard Collins*

THE RETURN FROM THE WILDERNESS Sunday 30 July to Monday 31 July

We distributed our remaining provisions to the scouts before leaving Njalayankhunda. We had brought in supplies of fish and other relish from Mzuzu on our way up there, so everyone seemed happy about our visit. Only Lewis Tumbuka travelled south with us and we dropped him off at Rumphi, buying further fish to take home to his wife at the market there. He had been away from home for over three weeks and had supported us throughout. His presence was always highly valued, although he did take a back seat during our trip to the Wovwe area, since the local scouts knew it better. The bus needed further attention to its rear springs at Mzuzu, so we sent Owen ahead with Humphrey, who caught the bus back to Mulanje in the evening. The rest of the team stayed with Ray Murphy just outside town, where we left our camp hardware, delivered our collected specimens and picked up data for the entomology report, before leaving early the next morning. I had earlier arranged a meeting in the Parks office in Mzuzu, where we were able to start to compile data and give the Regional Manager, Tommy Mhango and Research Officer, Heatherwycke Msiska, a preliminary briefing on our findings. This three-hour slot proved very helpful and should become the norm for future expeditions. By the time we had photocopied all the records in Chinteche, the organisation of the report was well ahead of any previous years. Everyone knew their responsibilities and their seemed to be no reason why publication should not be brought forward somewhat. The publication of a scientific, intelligence and logistical report is what makes the Biosearch Expeditions so valuable to the Department of National Parks and Wildlife.

Collating data, the Parks Office, Mzuzu *Peter Overton*

LAKE MALAWI AND RETURN TO LILONGWE

Two nights on Lake Malawi on the return trip to Lilongwe are always well received and well earned by our teams. Unfortunately some of the team picked up a sickness bug from Mzuzu on the way through. This was most unfortunate because our expedition itself was free from illness throughout, due perhaps to our meticulous attention to hygiene as well as remoteness from external sources of infection. Richard Collins could spend only one night at the lake before heading south on a minibus to meet an earlier flight commitment. The rest of the team headed off the following day and had a final meal in Lilongwe before departure the next morning. We were able to fit in a visit to the Parks office and have a final chat. Chiza Manda, who supported us at Thazima in previous years, had now taken up a post of Principal Parks and Wildlife Officer in Lilongwe, supporting the Assistant Director with Law Enforcement issues. It was good to have the chance to meet him again. The Director of Parks, Leonard Sefu, kindly re-iterated his support for the Biosearch project and pledged help to get the next team out in 2007. And so our partnership continues to flourish after ten years of productive work in the Nyika National Park.

Dugout canoe at Makuzi Beach *Richard Collins*

It is important to conduct careful planning, including contingency arrangements for when things go wrong - as they will occasionally. It is essential to have good communication with the team so they are always up to speed with the progress of the expedition and where they are going next. A team needs a clear focus of what is required and how it will be achieved and a business like momentum to get on with the job, with each individual pulling his weight fully in camp. These were features of this expedition, which made it run well and also made it easy to lead. We were also blessed with diverse skills, all of which were brought to the fore at the appropriate time. We are good at adventure and I am looking forward to the next team joining us!

Wovwe Valley
Marianne Overton

DIARY EXTRACTS

Adapted from contributions by Laura Miller and all team members

A call went up from Michael Scobie and we all rushed over to see a Puff Adder, right next to Simone's tent, the Palace. The palace is of uncertain origin, covers the area of at least three ants' nests, and includes a conservatory. It needs a servant to erect and contains a swimming pool, Jacuzzi and gym. The reception is manned from 8pm.

The snake was about a metre long. We called for Lewis but he had gone home so it was up to us! Two other visitors at Kazuni did not even come over to see it.
"Disgusting!", cried the architect. Michael Overton was outraged.
"How can they feel that? Look at its markings. It's beautiful, fantastic!" We managed to kerb the instincts of Michael and Laura to pick it up and made a plan. Peter got a net, which Marianne took charge of. Laura used a stick and Richard took control of the torch. The snake made a dash for freedom via our legs but was headed off by the net, which was gently placed over the apparently relaxed snake and it was encouraged to slowly move into it. What excitement! Marianne carried the peacefully curled cargo along the dirt track, at least 200 m from the camp and released it into some dead leaves at the base of a bush. Photos were taken as it posed itself to get reoriented, before it slid gently off into the leaves and vanished.

On my return I met a large group of women singing. They sang beautifully; the soft, warm voices that are typically associated with African music. They continued to sing for most of the afternoon and provided excellent background music.

Michel O caught a chameleon and Jen, Simone and I found something totally cool on Ray's bug light. It had a long furry body and looked a bit like a stretched bee and was of similar colouration. We thought it was fantastic, but our excitement was quelled when we were told it was only an ant. An ant!! Of all things, a disgusting vile ant; but it looked so beautiful! Eventually everyone went to bed, the first night in tents for a while. I settled down quickly and would have fallen asleep if it hadn't been for Simone's panicked cries. She had heard a rustling under her tent and became frightened. I lifted up a corner and was shocked to see that there were millions of ants having a party.

Walking up to the Thazima office with Simone, Jen and Mariann, I stumbled across a chameleon, literally stumbled across it, almost stood on the poor thing. That would have totally ruined my day. The chameleon was quickly tamed and stayed with us for at least an hour while we had lunch. I enjoyed moving it on to different backgrounds, so that it changed colour. I don't think that eating with a chameleon in one hand and a roll in the other was particularly hygienic. Am I bothered? I think my immune system must be like steel.

The 2006 group is very different. They actually get up and want to do stuff; Michael Scobie and Simone have taken the large mammal project as their own and are really enthusiastic. Richard is dealing with the navigation and the poaching report and is keen to get involved and flexible enough to work on all projects.

Today's quadrat looked quite evil and proved difficult. We were in an area with many rivers, which meant steep inclines and valleys. There was also a lot of water in the rivers, which had to be negotiated. Lewis acted like a bulldozer, throwing himself at the vegetation in order to break it down and form a bridge, which was quite dodgy, but workable.

We hadn't got too far, when Marianne stopped to admire a particularly interesting pile of jackal poo. We left her. Ryle stopped suddenly; his call of "Snek, snek" rang out. Adrenalin suddenly filled our veins as we rushed to investigate. A small brownish snake of about 90cm in length was wriggling around the burnt area. I called for Marianne, who stopped her poo-ology and came running with her net, waving it wildly. A bit of a comic moment as she looked like a mad scientist or eccentric butterfly hunter, but she was too slow and arrived too late, only to witness its tail vanishing down a convenient hole. The hunt was on.

I decided that I would have to take advantage of the shower block. It was the first time in three weeks that I had seen myself in the mirror. I wasn't impressed by what I saw. I couldn't believe that, as the older women of the group, neither Simone nor Marianne told me that my face was so filthy! I was quite annoyed and even more so by the fact that my photo had been taken on so many occasions, I was going to look like a tramp in the report. It took me three attempts of hard scrubbing to clean my face and the others had the cheek to say they thought I had a "nice suntan". They were surprised how pale I was, I too was surprised, I was hoping the lovely golden colour I now was, was due to my exposure to the sun. No such luck it was pure dirt.

I slept as much as I could. My dreams were of the team, I dreamt about climbing Fingira rock, the snake finds, sleeping out on the rocks and watching shooting stars, the strange conversations about purple chicken and the meaningful debates about whether McDonald's or Burger King is best. When I was in the strange period between waking and sleeping, I could smell the comforting smoky, earthy smell that was attached to my jumper and thought I was back in camp. I could even hear voices, sometimes the slow, soft tones of Richard; other times the higher more frenetic sounds of Marianne. As I awoke I realised that although the phonetics were right, the language and the accent were seriously wrong and I was definitely not in camp. The first time this happened I woke up stressed and almost had a panic attack. I eventually calmed down. I kept thinking back to the expedition and although only a few moments stood out as clearly memorable, I cannot ever remember being miserable, hating anyone or really regretting doing it. The team were absolutely brilliant. It is rare to find a bunch of genuinely nice people that have a common goal to pursue and so instead of feeling sad for leaving I began to

feel privileged and proud to have worked so closely with such an excellent group of people.

CATERING REPORT

Laura Miller

SHOPPING

The majority of the shopping was done in Lilongwe at Shoprite, before the arrival of the main team. The sardines with tomato sauce had to be obtained from People's supermarket and the bread from 7//11. It was planned that the fruit and vegetables would be purchased from local markets on the way to the Nyika. However, the bulk of fresh items were bought in Mzuzu, and supplemented at later opportunities. Buying from the markets was a little more time-consuming, but was advantageous as the quality of food was generally higher and could be purchased at differing stages of ripeness to ensure that it kept well in the bush.

FEEDING THE TEAM

The food side of the expedition was extremely successful. There were few fussy eaters and several keen chefs and enthusiastic assistants. It was understood that everyone could not be satisfied all the time and those with more particular dietary requirements had to simply make do on a few occasions, as it was neither practical nor desirable to cook numerous meals to suit the tastes of everyone on the expedition. It was also mandatory for team members to be present when food was being served. This ensured that everyone was fed before those with a near insatiable appetite had seconds. Despite this hard-line approach all team members were fed and no one went hungry.

The meals prepared were all relatively simple and generally unadventurous, comprising mainly a vegetarian base, normally mashed potatoes, pasta or rice served with vegetables and sauce and occasionally optional meat. The simple nature of the meals enabled them to be prepared in a great enough quantity to satisfy the hunger of a hardworking team and quickly enough to beat the inevitable encroaching darkness. Often it was preferable to adopt a vegetarian diet, as with the exception of some seriously tasty fillet steak, the meat available was not particularly appetising. The meatballs were acceptable and provided a welcome change from cabbage. However, the corned meat, ("Cat food" as it became known), a delicate mixture of mechanically de-boned poultry and heart, was not to anyone's taste. Its flavour was overpowering and uncomplimentary to many of the sauces or flavours available and the texture was off-putting. It has been deleted from the provisions list for future reference.

PROBLEMS

With the exception of Kasito lodge and the overnight stay at Ray Murphy's place north of Mzuzu, where we had the luxury of electricity, all cooking was carried out over an open fire. This caused very few problems, as the team was intelligent and flexible enough to quickly adapt to the challenge of campfire cooking. It was hardly rocket science. The two main problems were controlling the fire and avoiding the smoke.

The fire takes time to achieve a desirable cooking heat and then needs constant attention. This lack of control meant that, despite excellent planning, it was difficult to get the timing of meal components exactly right. Once this problem was fully understood the 'hot spots' and 'cool spots' of the fire could be manipulated to the advantage of the team. Many of the sauces, beans and meatballs required a constant low to medium heat to cook without burning, while potatoes, pasta and rice could be cooked more rapidly on a high heat to keep them boiling ferociously.

The second and certainly the most frustrating problem with campfire cooking, was the smoke. Not only did this cause choking, it dissolved into the aqueous parts of the eye and caused prolonged irritation. This could not really be avoided and proved difficult when precision cooking relied entirely on sight. The swimming goggles supplied by Jen and a bandit style scarf placed over the nose and mouth certainly helped but it was teamwork that eventually solved this conundrum. Cooking and stirring was mainly completed by at least two people who would rotate, taking turns to brave the smoke.

FAVOURITE CAMP RECIPES

Compiled by Laura Miller

PASTA

Made by Laura Miller and Michael Scobie

Ingredients

3 tins of chopped tomatoes	Sugar
4 fresh green peppers	Salt
3 onions, slightly past their best	Basil
Fresh tomatoes	2 cloves of garlic (old)
750g Macaroni	Garlic powder
Cheese	3 packets of Coleman's cheese sauce
Powdered milk	Oil

The pasta was added to a large pan and adequate water poured over the top. The pan was then covered with a lid and placed over medium to high heat to boil. It was cooked for approximately 10-15 mins.

The Onions, peppers, garlic and fresh tomatoes were finally chopped and softened over a medium heat with a little oil. The tinned tomatoes were then added along with the basil, garlic powder and onion flavourings. The sauce was then flavoured with salt and sugar before being tasted and the flavours adjusted, so that the individual components were distinguishable but not overpowering.

In a separate pan 1-½ pints of powered milk was made and the cheese sauce mixture added and whisked with a fork to avoid lumps and placed over a medium to low heat. A reliable assistant was employed to continually stir the sauce to prevent burning. A cheese sauce mix was only used to conserve other ingredients; there is no other reason why this should not be made from scratch. The expedition had plenty of cheese but it is more weight to be carried on our forays away from a base camp.

The pasta was then served and a generous quantity of each sauce placed on top. Finely sliced cheese was added to finish the meal.

PUDDING

Prepared by Laura Miller and Michael Overton

Ingredients (for 9)

3 packets of slightly soggy rich tea biscuits	3 tins of fruit cocktail
Custard powder	Powdered milk
Brown sugar	Plain flour
Butter	Honey

Method

A sweet, rough crumble mixture was made using the butter, sugar and flour. The soggy biscuits were crushed, but not too finely, and added to the crumble mixture. These were heated over a low heat; honey and extra butter were added to aggregate the mixture. It was extremely important that the heat was low and that the mixture was continually stirred to prevent burning. It was then transferred to a large shallow plan and compressed to make a firm base. The juice from 3 tins of fruit cocktail was drained and consumed by an assistant and the fruit placed on the base and spread evenly.

In a separate pan several spoons of custard powder, powdered milk and sugar were mixed with adequate water and placed over a low to medium heat. A reliable assistant was once again employed to continually stir the mixture to prevent the formation of lumps and burning. A thick smooth custard was produced. This was then poured over the fruit and placed somewhere cool (and ant free) to set.

PINEAPPLE FLAMBÉE

Prepared by Marianne Overton

Ingredients

1 pineapple, ripe or not
Honey
Brown sugar
Butter

3 Oranges
½ litre Passion fruit juice

Spirit (Brandy, Orange liqueur)
contributed by Simone!

Method

Cut off the peel from a pineapple; remove the eyes, slice and fry lightly in butter. Add 3 tbs sugar (at least!), honey (1tbs) and ½l passion-fruit juice. Add the peel of one orange, finely grated. Add pieces of orange with all white pith removed. Boil until sugar starts to thicken when cooled in a glass of cold water. Heat a ladle of spirits over the fire, get everyone ready to watch and pour over the pineapple

BREAD

Prepared by Simone Gentner and Micheal Scobie.

Ingredients

1 kg bread flour
1 teaspoon of salt
500 – 600 ml tepid water

1 sachet of yeast
2 teaspoons of sugar

The flour, yeast, sugar and salt were placed in a bowl and a small well was created. The water was gradually added to the flour and mixed by working flour in evenly from the edge until a soft ball was made. This was then kneaded for approximately 10-15 mins. It was then transferred to a cooking pot and covered with a damp cloth before being placed in the sun for 2-3hrs to rise. Once risen the cooking pot was placed into the hot ash of the fire and embers placed on top. It was cooked slowly for approximately 2hrs and regularly checked by a scout, normally Alfred. To test the cooking of the bread it was tapped, if cooked it sounded hollow.

To increase the crispiness of the crust, a small amount of milk and sugar was applied prior to cooking. To add variety Nyika honey and Macadamia nuts were added to the bread before cooking. This worked extremely well and the bread produced proved irresistible to some team members.

PROVISIONS

for 8 x 28 days

Item	Quantity
Apples	3 kg
Avocados	20
Bananas	50
Cabbages	10
Carrots	4 kg
Cucumbers	3
Green beans	4 kg
Green peppers	10
Lettuce	2
Papaya	3
Pineapples	5
Baked beans	24 tins
Baking powder	1 tin
Bin liners	1 roll
Biscuits (sweet)	10 packs x200g
Bread	8 loaves
Bread Rolls	40
Cooking oil	5 litres
Custard - Instant	3
Disinfectant - Dettol	1
Cheese - cheddar	25 packs x 400g
Chilli hot sauce	1 bottle
Chocolate drink - Milo	15 x 250g cartons
Coffee	1 x 500g
Spam	20 tins
Instant custard powder	5 packs
Drink - fruit	3 x 5 litres
Eggs	60
Fish -kapenta	5 kg
Flora margarine	4 x 500g
Flour for bread	2 x 2.5kg
Fruit – dried mixed	4 x 1 kg
Fruit cocktail	24 tins
Gin – Malawi	1 x 500 ml bottle
Herb mixture	2 small shakers
Juice - grenadilla	2 x 2 litres
Juice - guava	2 x 2 litres
Macaroni	6 x 500g packs
Maize flour	2 x 2kg
Margarine	3 x 500g tubs
Matches	2 x 6 box
Meatballs in gravy	24 tins
Milk – liquid sterilised	24 bottles
Milk powder – NIDO	2 x 900g tubs
Onions	6kg
Orange squash-Sobo	4 x 2l bottles
Oranges	1
Peanut butter	20 pots
Peanuts	2kg
Pepper	1 x 100ml pot
Porridge oats - Jungle	25 x 500g bags
Potato dried	10 packs
Potatoes	30kg
Provita biscuits	20 packs
Rice	2 x 5kg bags
Rusks	10 x 500g boxes
Salt	1 x 500g
Sardines/tom	10 tins
Sauce - Bolognese	5 packs
Sauce - Cheese	5 packs
Sauce - Pepper	5 packs
Sauce - Peri Peri	1 bottle
Sauce - Sweet & sour	5 packs
Sauce - white	5 packs
Soup – vegetable	24 packs
Soya – tomato & onion	6
Spaghetti	6 x 500g packs
Sugar - brown	1 kg
Sugar - white	14 x 1kg
Tea Bags	Box 100
Tinfoil	2
Tomato Sauce	1 bottle
Toilet rolls	28
Tomatoes	12 kg
Tuna	25 x 170g tins
Usavi mix – Royco	18 x 75g pkts
W/U liquid	1 x 1.5l
Yeast – instant dried	8
Water in bottles	40 x 500ml bottles

Hardware

Item	Quantity
Candles	4
Bowl plastic large red	1
Bowl plastic large blue	1
Bowl plastic small red	1
Bucket – green plastic	1
Bucket – red plastic	1
Grill /Mesh for fire	1
Trays – plastic	3
Machetes	3
Hoe	1
Ladle	1
Birthday candles	1 box
Cheese Grater	1
Tinfoil	2
Cutting boards	2
Knives	3
Food bags reseal	2 packs
Fish slice	1
Frying Pan	1
Insulated box	1
Potato Peeler	2
Culinder spoon	1
Machetes	2
Omo powder	3
Pan scrubber	1 pack
Nest of Cooking pans	1x6
Mosquito net	1
Fire gloves	1 pr
Machetes	2
AA batteries	Pack of 20
AAA batteries	4x2

CAMP DESIGN AND TECHNOLOGY

Richard Collins (all photos by R. Collins)

PICKING A GOOD BASECAMP SITE

We located flat, grassy areas close to water in open valleys, preferably sheltered from wind by the lie of the land. (Flash floods were not a risk in the dry season.) Base camp had to be fairly close to a track for vehicle access, but field camps were up to a day's walk from vehicle access.

PREPARATION FOR TENTS

We cleared grass and sticks from tent-sized patches of ground with panga and hoe, making sure to cover any exposed soil with loose grass to stop moisture and ants. Thus tents were pitched on smooth ground. Wild pigs make excellent "nests" with substantial amounts of cut grass and our most successful "tent nests" were good copies of these!

Preparing the ground before pitching tents

DRINKING WATER

After conducting a recce we were able to pick a site for drinking water and cleared it away with panga and hoe. We then made a bridge with four sticks.

We did a quick survey of water flow: speed 0.4 –1.0 m/s and cross-sectional area: 0.3m deep and 1.2m wide. Although often only a small width showed, there was more hidden underground. This equates to a flow of around 144 l/sec.

TOILET

Toilet under construction

The first toilet dig had to be aborted because we hit rock. The second attempt was more successful. The depth was about 0.6-0.8m, more than enough for twelve people for a week. Logs and sticks were carefully laid across, leaving a gap and then cross-sticks to make a hole from the slot. Grass and mud was then used to secure and finish it off.

Driving stakes into the ground, sticks about 2m long with a sharpened point, made a screen. Bamboo-like sticks were tied at the top and bottom with palm grass. Then grass was bunched and placed vertically, sandwiched with more bamboo.

Creation of the screen around the toilet

WASHING WATER/ BATH

Down river we made a wash site. It was very impressive, with a natural earthen bridge across. It was then cleared and tidied away. The bath that was made was great. We had thought of damming up the other side of the tunnel but the volume and flow of water as it was, meant it wasn't necessary. After the work was done the water cleared very quickly. The two Michaels found two big flat stones that were positioned as perfect seats.

SUMP

A hole was dug with hoes to act as a sump for cooking waste and washing up water, to minimise the environmental impact.

FIRE

A structure was made to lift the fire off of the ground using scraps of bark and twigs.

Lighting a fire – an important skill when in the bush

To light a fire in damp conditions dead grass was found underneath the dew-covered bushes. Dried grass was added in bundles, then twigs and finally larger branches. On lighting it we had a roaring fire within seconds. Old logs were laid parallel, on either side, providing support for pots. Firewood was collected from the dead branch of a tree across the river and carried down to camp.

SEATS
As the fire was the centre of action and attention, the addition of simple seats around it was much appreciated. Initially we sat on logs laid on the ground. However, the scouts made new and improved structures; supports were driven into the ground with a branch laid across. This meant we could sit up to eat our dinner

WASHING LINE
Three tall sticks were sharpened then driven into the ground in a triangle. A string was tied and we had a washing line. Guy ropes can be used to support the structure.

FRIDGE
It was great that we were able to keep items like cheese and eggs for long periods after moving into the park. We had a polystyrene box containing the food, which we managed to submerge partially in the river under a shaded stretch. This prolonged the life of many items of food that would have otherwise been unavailable.

BAZAAR
It was necessary to keep our food and supplies in order and also protect them from scavenging animals and birds and the midday sun. A structure was made of four vertical poles, lashed horizontally. We were able to get machined planks from Chelinda from our first base camp, which was very handy, but on another occasion branches were carefully laid to make a structure almost as flat. It is also very useful if a roof and screen are included to help shade the food. These are made in a similar way to the screen described for the long drop above.

Storing the food off of the ground to deter the local wildlife

Richard demonstrating the strength and stability of a well crafted bazaar

ECOLOGICAL IMPACT
The impact we were having on the environment was always foremost in our minds. The ideal is to leave the site exactly, or as close as possible to the condition it was before we arrived. Any inorganic rubbish such as plastics or metals must be kept and taken out when leaving. Organic material can be placed in the sump and then covered with soil when leaving. The fire is an area where particular care is needed; it must be fully and thoroughly extinguished when leaving the camp.

MEDICAL NOTES

Marianne Overton

INTRODUCTION

Hygiene was good, so we had very little illness at all during the expedition and at the final meeting in Mzuzu, I congratulated the team on looking after themselves so well. Indeed, a healthy diet, lots of exercise and good sleep at night, very little alcohol or stress was all doing us a power of good.

Each European team member carried a full first-aid kit, much of which was left with our partners on departure. Training in the UK was effective and members did an excellent job in preventing dehydration, heat exhaustion and infections. My training in first aid at work and wilderness medicine was not needed directly, but all our medical training gave us a keen awareness of risks and how best to avoid them.

FIRST AID KIT

The personal kit list was adequate. Anti-nausea tablets could be a useful addition. Some people believe tablets for nausea and vomitting are better avoided, thus allowing the bacteria to escape the body. Others prefer to take the tablets for convenience, easier hygiene and comfort.

In addition to the agreed personal kit, I also carried emergency adrenaline for anaphylactic shock, an inhaler for asthma and antibiotics, as advised by the RGS medical training. Quinine sulphate was also included in the kit in the unlikely event of someone showing symptoms of malaria.

My Personal First Aid Kit

IN THE FIELD

In the field, diarrorlite and paracetamol were used three times to treat dehydration and mild heat exhaustion, in two scouts and a European team member. Most of the team also used Diarrorlite as a preventative measure after a tough day. Our diet was good, with porridge every morning getting us off to a good start and plenty of fresh food at the base camps. We had a taste for a bit more salt in our food than we would have at home, thus replacing what we had lost in sweating. People also tended to use more sugar.

Our one injury was a twisted knee after one team member put her foot awkwardly into a hole, just a kilometer short of the Juniper base camp. The knee mended reasonably well after three days following cooling, bandaging and rest.

One person had a sore eye, which responded well to Golden eye drops and rest from contact lenses. The smoke from the fire was an irritant and probably the least healthy aspect of our life in the bush. One team member had an occasional cough, which I thought sounded like asthma, but they felt it was an infection. It cleared up during the daytime.

IN "CIVILISATION"

The night we reached luxurious civilisation on the lakeshore was the first sign of ilness in the team. Four members in turn went down with vaying degrees of stomach cramps, sweating, nausea and diarrhoea. We nursed to keep the temperature even and treated with rest and diarrorlite. They were reasonably recovered within 24 hours. In transit, it is important to avoid suspect foods, only drink bottled drinks and to use antiseptic travel wash at every opportunity.

REFERENCES

First Aid at work and Wilderness medicine course by John Dallimore plus course materials
Warrell, D. and Anderson, S. 1998 *Expedition Medicine.* Royal Geographical Society
Risk Assessment, *Training Schedule and Briefing Notes*, *First-aid Kit Lists*. Internal publications updated annually.
World Health Organisation www.who.int/en *Community Health Services Travel Advice*

Medicinal Aloe, treatment for stings *Laura Miller*

CAMERAS & TENTS

Richard Collins

PHOTOGRAPHY

Primary objectives were agreed as follows:

- Forensically photograph scientific finds
- Photographically record the events of the expedition
- Record each member of the expedition
- Take appropriate group photographs

Name	Camera	Film/ Memory	Comments
Marianne Overton	Olympus trip	512 mb card	Good for pocket camera for simple quick shots, telling expedition story. Needed spare rechargeable battery.
	Minolta 8000i SLR 28-80mm lens. 100-300 zoom. 50mm macro to 2.8	400 ASA slide Fugichrome Sensia	Good quality for publishing. 5 films not enough.
		Kodak Ultra Colour Print 400 ASA	3 films
Richard Collins	Samsung Digimax A7 7.0 MegaPixels Zoom 7.7- 23.1mm	512 mb card	Pocket size, higher settings give very good quality with a reasonable zoom, choice of quality and pixel size is useful to balance memory use and quality depending on shot. Good macro and can take videos.
Michael Scobie	Fujifilm S5600 5.2 Megapixels 10x optical zoom	512mb card x2	Learn all setting before trying to use. Lightweight but bulky. Good zoom, which proved very important
Simone Gentner	Sony mpeg Movie HQX DSC-P7		Good pocket camera for simple shots
Jenna Birchall	Sony DCR-HC35 miniDV camcorder. Carl zeiss lens. 20x optical zoom, night shot and still shot		Good size and lightweight. The option between recording film footage and still photos in one was very handy. Quite simple to use. Battery life is quite long, as it does not run down when not in use. The optical zoom is crucially important giving clear and detailed shots
Michael Overton	Panasonic PMC-L25 Lumix 6.0 Megapixels. 6x optical zoom, 16x digital zoom. Video	512mb cards x2	Good size to fit into case on belt. Large screen size and very useful zoom. I found the macro to be essential. Went through 5 pairs of AA batteries and needed more.

REVIEW OF TENTS

A wide variety of tents, (with regards to size, weight and cost) were used on the expedition, all of which proved successful in providing a temporary home for the duration of the stay in the Nyika.

Name	Tent	Comments
Richard Collins	Wynnster, 3 man, 2 skin	Resoanbly lightweight, especially relative to size. Comfortably fits 2 plus their bags. Easy to erect; frame will stand without pegs
Hassam Patel	Given by Quincy, 1 skin Inadequate	Very lightweight and small for one person only. Old tent, gives problems in the field, cold and starting to tear
Michael Scobie	Karrimore Beta, 2 man, 2 skin	Good tent, easy to erect and can be used without pegs. Well ventilated and waterproof. Not particularly warm
Simone Gentner	Jack Wolfskin Tundra 3RT" weighs 7 kilos and cost £150.00.	It was a little on the large side and it was also heavy and cumbersome to carry
Jenna Birchall	Colman's tent mountain, 2 man	2.6 kilograms, pegs are always needed to keep it supported
Michael Overton	1 man tent relying on 2 rigid poles and 4 guide ropes	Very light but also very small. Difficult to erect without the inner and outer skin touching so problem of getting wet. Weak and worn material resulted in foot long tear.
Peter and Marianne	Blacks Skye 2 man tent	Can be used as a 3 man on treks. Not light enough for long treks but useful design with plenty of headroom and the inner can be left connected for quick pitching. Advantage not needing pegs to anchor. Seams ar- fragile so not likely to last long with heavy use.
Laura Miller	1 man tent relying on 2 hoops and guide ropes.	Very small and light, can be put up with just 2 pegs. A bit too small, insufficient room for rucksack and all equipment. Cheap.

PHOTOS IN FOLLOWING 11 PAGES

IN SEQUENTIAL ORDER (top left to bottom right on following pages)

Page 1 *Marianne Overton*
Fighting through the undergrowth in the Upper Wovwe
Michael Scobie at falls on the River Wovwe
Laura Miller defying gravity at Fingira Rock
Marianne Overton making pineapple flambée

Page 2
Picnic at Poachers' Rock in the Upper Wovwe area *Marianne Overton*
Falls on the River Wovwe *Richard Collins*
Richard Collins on a tree vine *Marianne Overton*
Fluted trunk of *Aningera adolfi-friedericki* (Diameter 5.93m) in Zovo Chipolo forest ("the place where they killed the elephant") *Marianne Overton*

Page 3
Team on top of Fingira Rock Richard Colllins, Hassam Patel, Michael Overton, Simone Gentner, Marianne overton and Laura Miller *Michael Scobie*
Simone Gentner recording tree diameter in Forest Patch *Marianne Overton*
Hassam Patel and Michael Overton in *Brachystegia* woodland. *Marianne Overton*

Page 4 *Marianne Overton*
Steep slopes with dense vegetation tackled by Jenna Birchall and Simone Gentner.
Jenna Birchall investigating a salt lick in a termite mound.
Richard Collins and Jenna Birchall preparing Crèpe Suzette.
Bush rations can be interesting!
Humphrey Chapama and Hassam Patel preparing seeds
for the Millennium Seed Bank

Page 5 Plants
Dierama densiflorum *Marianne Overton*
Pteris cretica (fern) *Marianne Overton*
Thunbergia alata (*Black-eyed Susan)* *Michael Overton*
Chironia laxiflora *Marianne Overton*
Dissotis princeps *Michael Scobie*
Delphinium dasycaulon *Marianne Overton*

Page 6
Bushbuck *Tragelaphus seriphus.* Background:flowering *Acacia* *Marianne Overton*
Puff Adder *Bitis arietans* at Vwase *Michael Overton*

Page 7 Large mammals
Roan Antelope *Hippotragus equines* *Michael Scobie*
Zebra *Equus buchelli* *Richard Collins*
Hippos *Hippopotamus amphibious* at Vwase Wildlife Reserve *Michael Scobie*
Elephant *Loxodonta africana* at Vwase Wildlife Reserve *Michael Overton*

Page 8 Invertebrates
Grasshopper Family Acrididae, *Truxaloides braziliensis* *Michael Overton*
Locusts; Family Acrididae, *Ornithacris sp.* *Michael Overton*
Family Pyrgomorphidae, *Taphronota sp.* *Michael Scobie*
Family Pyrgomorphidae, *Phymateus sp* *Michael Overton*
Family Buprestidae, *Psiloptera albomarginata* Jewell beetle *Michael Overton*
Caterpillar *Michael Scobie*

Page 9

Striped Skink *Mabuya striata*	*Michael Overton*
Freshwater Crab	*Michael Overton*

Page 10

Purple *Parogala imbricata*	*Marianne Overton*
Dragonfly *Palpopleura lucia* - Family Libellulidae	*Michael Overton*
White Orchid *Satyrium sp.*	*Marianne Overton*
Orange Compositae	*Marianne Overton*

Page 11 At Makuzi

Farewell dinner	*Simone Gentner*
Rondavel accommodation	*Simone Gentner*
Sunrise on the lake	*Michael Scobie*































SOIL AND VEGETATION COMMUNITIES

Laura Miller, Hassam Patel and Marianne Overton

ABSTRACT

Over 250 species of plants were identified on this year's expedition and there are several species that are yet to be identified. These have been taken to the National Herbarium at Zomba for identification. Montane grassland, *Brachystegia* woodland, evergreen forest patches and areas of dambo were samples. Three main communities were identified and it is proposed that the different species of the genus *Helichrysum* could be used as indicator species of community type. The soil was mainly acidic and loamy with a large organic content in the evergreen forest patches.

INTRODUCTION

An investigation which aimed to continue the on going qualitative evaluation of the flora found within the Nyika National Park, Malawi and add to existing records, also to carry out a quantitative analysis of ground flora using $4x4m^2$ quadrats, and finally asses the texture and pH of the soil. Plants do not generally exist alone or as a monoculture, instead they interact with each other and with other organisms to form communities.

Different communities are often indicative of abiotic conditions including, moisture and soil pH. It was this community interaction that the investigation was concerned with.

Soil texture simply describes the size of the mixture of soil particles and can be defined as the relative proportions of sand, silt and clay. Texture is a fundamental property and is influential in determining key characteristics such as drainage, water retention and susceptibility to erosion it is also a major contributing factor in soil structure (DEFRA).

Accurate determination of texture requires laboratory analysis, however for practical purposes hand texturing has been developed for use in the field. The method relies upon the users ability to distinguish key textural components such as grittiness, which indicates the presence of sand, silkiness, or a buttery feel, to indicate silt and the soils ability to mould into a coherent ball which suggests the presence of clay (Carlisle, 2004). This method can be carried out quickly, with relative ease and without the use of any specialised equipment.

Soil pH was also tested in the investigation. Most soils have a pH of between 5.5 and 7.5 with the optimum pH for the growth of many mesophytic plants lying between 6.5 and 7.5. The pH of the soil is an important determinant of plant growth and has a significant impact on ion exchange and nutrient availability (Foth, 1990). At low pHs essential nutrients, including Nitrogen, Phosphorous and Potassium are less available due to their inability to compete with hydrogen ions which flush out cations fromtheir binding sites on the soil particles.

METHOD

Soil pH

The pH of the soil was determined using a BHD soil test kit. A small amount of Barium Sulphate was placed in one end of a double-ended test tube. The soil to be tested was then added followed by distilled water and several drops of indicator solution and the tube shaken vigorously before being allowed to settle. The resulting colouration was then compared with the colour chart provided (see Figure 1) and the pH determined.

The soil texture was established by using the "Soil Pathfinder method" which was created by Pan Britannica LTD and refined by MAFF. Water was added to the soil sample to firstly moisten it and then in sufficient quantity to achieve maximum cohesion of soil particles. The soil was then worked between the fingers the thumb to break down aggregates and reduce the effects of its structure. The following key (Table 1) was used to determine the soil texture using approximately one desert spoon of sample.

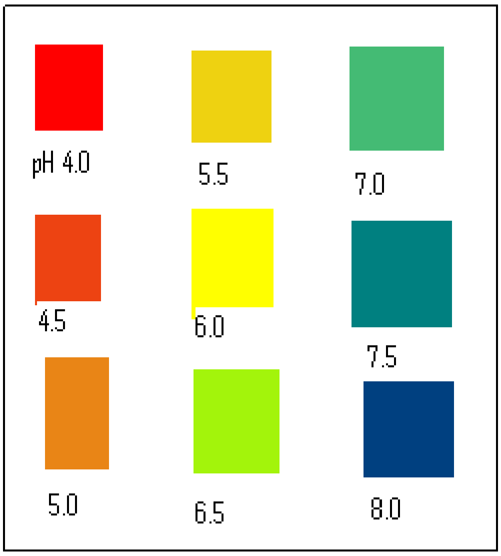


Figure 1 Colour chart from which the pH could be determined by comparison with the sample

Laura Miller analysing soil at base camp.

Table 1 The key used to determine soil texture of mineral soils

No	Question	Answer	Go to
1	-Does the soil have an obvious sandy feel -If rubbed between finger and thumb close to the ear, sand particles can be heard grating ?	Yes No	2 6
2	Does the soil lack all cohesion?	Yes No	Sand 3
3	Is it difficult to roll the soil into a ball?	Yes No	Loamy sand 4
4	Does the soil smooth and silky as well as sandy?	Yes No	Sandy silt loam 5
5	Does the soil mould to form a strong ball that smears without taking a polish?	Yes No	Sandy clay loam Sandy loam
6	Does the soil mould to form an easily deformed ball and feel silky and smooth?	Yes No	Silty loam 7
7	Does the soil mould to form a strong ball that smears without taking a polish?	Yes No	8 10
8	Is the soil also sandy?	Yes No	Sandy clay loam 9
9	Is the soil also smooth and silky?	Yes No	Silty clay loam Clay loam
10	Does the soil mould like plastercine, polish and feel very sticky when wet?	Yes No	11 Start again, unless soil is organic, if so use Key 2
11	Is the soil also sandy?	Yes No	Sandy clay 12
12	Is the soil smooth and buttery	Yes No	Silty clay Clay

Table 2 Key used to determine texture of organic soils

No	Question	Answer	Go to
1	Is the soil very black, loose and with a low density	Yes No	Peat 2
2	Is the soil grey to black; does it bind to form a ball which breaks readily?	Yes No	3 4
3	Is the soil also sandy?	Yes No	Sandy peat Loamy peat
4	Is the soil grey; does it bind to form a ball that holds together firmly and feels smooth?	Yes No	Peaty loam 5
5	Is the soil dark coloured but the mineral component dominant?	Yes No	Add organic to mineral texture. Use key 1

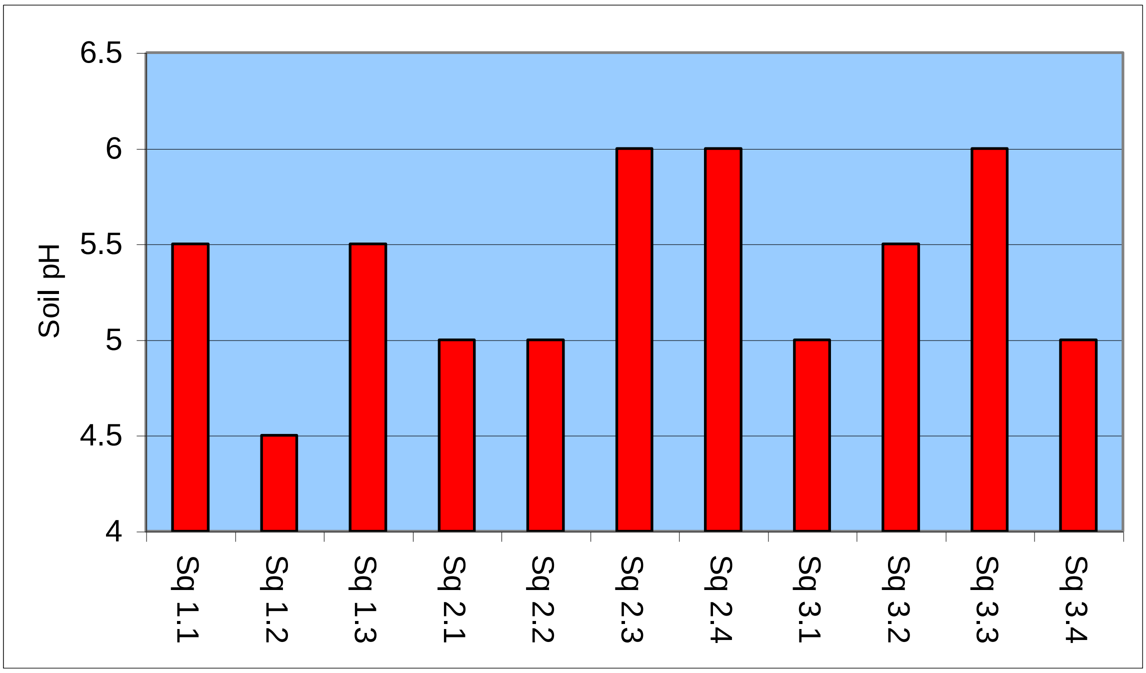
Vegetation

A 4x4m quadrat was placed over an area that was deemed to be representative of the vegetation present in each of the large mammal squares. The percentage cover of ground flora was assessed and recorded. Any trees present were recorded and the diameter at breast height (DBH) measured if appropriate.

The percentage cover of each species in a sample was then given a rank between 1 and 5; 5 being a very high percentage cover or the dominant species in a quadrat and 1 being a very low percentage cover, generally lower than 10%.

RESULTS

Figure 2 displays the pH of the soil sampled from the squares in the Fingira area



The range of pH is relatively small, the lowest being pH 4.5 found in square 1 and the highest being 6.

Table 3 The texture of the soil sampled near Fingira

Square no	Plot no	Texture
1	1	Sandy silt loam
1	2	Silty loam
1	3	Silty loam
2	1	Silty clay loam
2	2	Clay loam
2	3	Silty clay loam
2	4	Silty clay loam
3	1	Silty clay loam
3	2	Silty clay loam
3	3	Silty loam
3	4	Silty loam
4	1	Silty clay loam
4	2	Silty clay loam
4	3	Silty clay loam
4	4	Silty clay loam

Table 4 The texture of soil sampled near Zungwara.

Square no	Plot no	Texture
1	1	Sandy clay loam
1	2	Sandy clay loam
1	3	Sandy clay loam
1	4	Clay loam
2	1	Sandy clay loam
2	2	Silty clay loam
2	3	Silty clay loam
2	4	Silty clay loam
2	5	Silty clay loam
3	1	Clay loam
3	2	Clay loam
3	3	Silty loam
3	4	Clay loam
3	5	Clay loam

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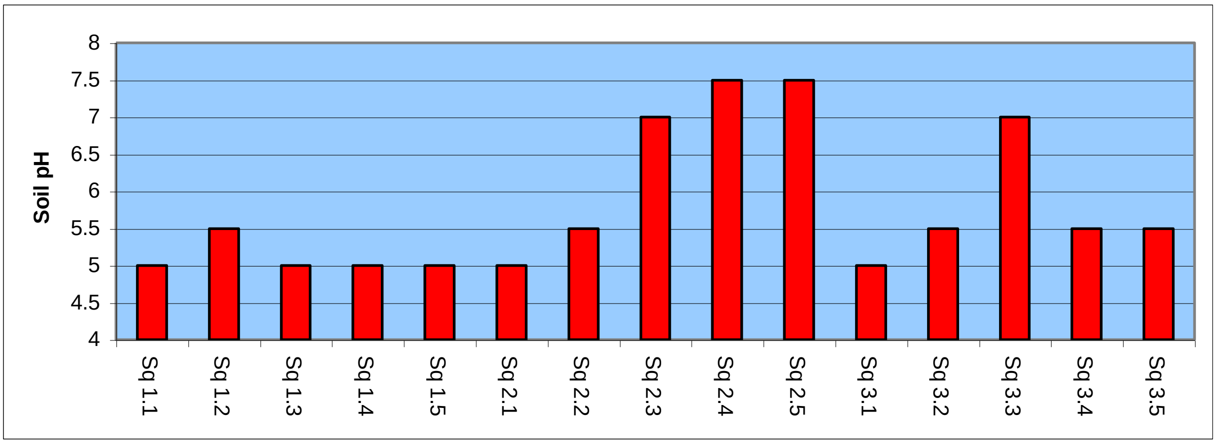
The soils found in both the Fingira rock area and the area of Zungwara were all loams with those in the Fingira area containing a greater proportion of silt and those in the Zungwara area containing more clay or sand.

Figure 3 The pH of the soil sampled near Zungwara. The pH tended to be higher in the Zungwara area, than that tested from around Fingira.



As seen in Figure 3 the soils tested were mainly acidic with the exception of some found in square 2 which had a relatively high pH.

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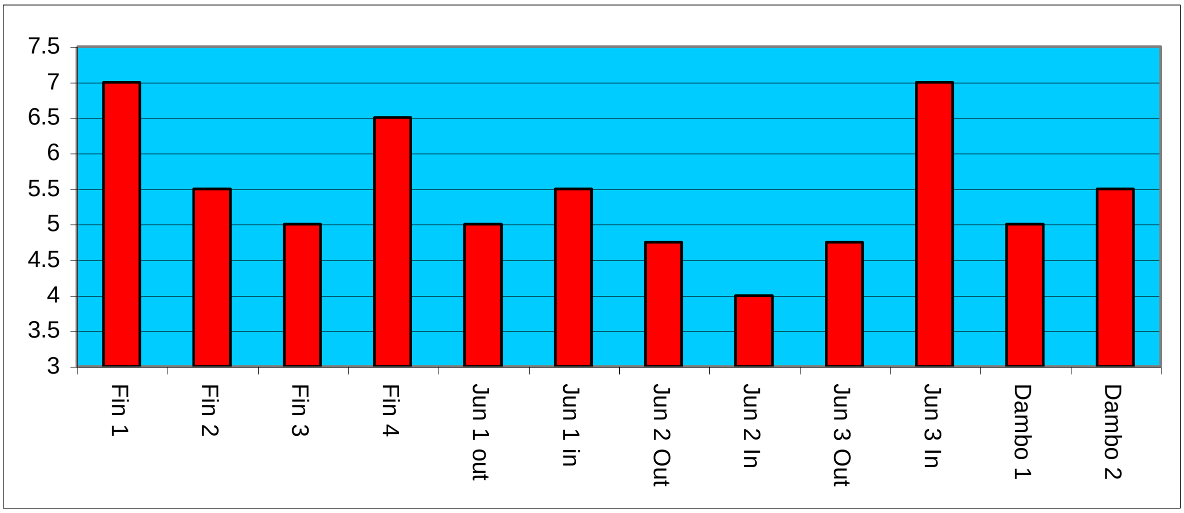


Figure 4 displays the pH of the soil collected from evergreen forest patches and Dambo regions.
Fin = Fingira area
Jun = Juniper

The soils from the forest patches and the Dambo regions were varied, but still mainly acidic.

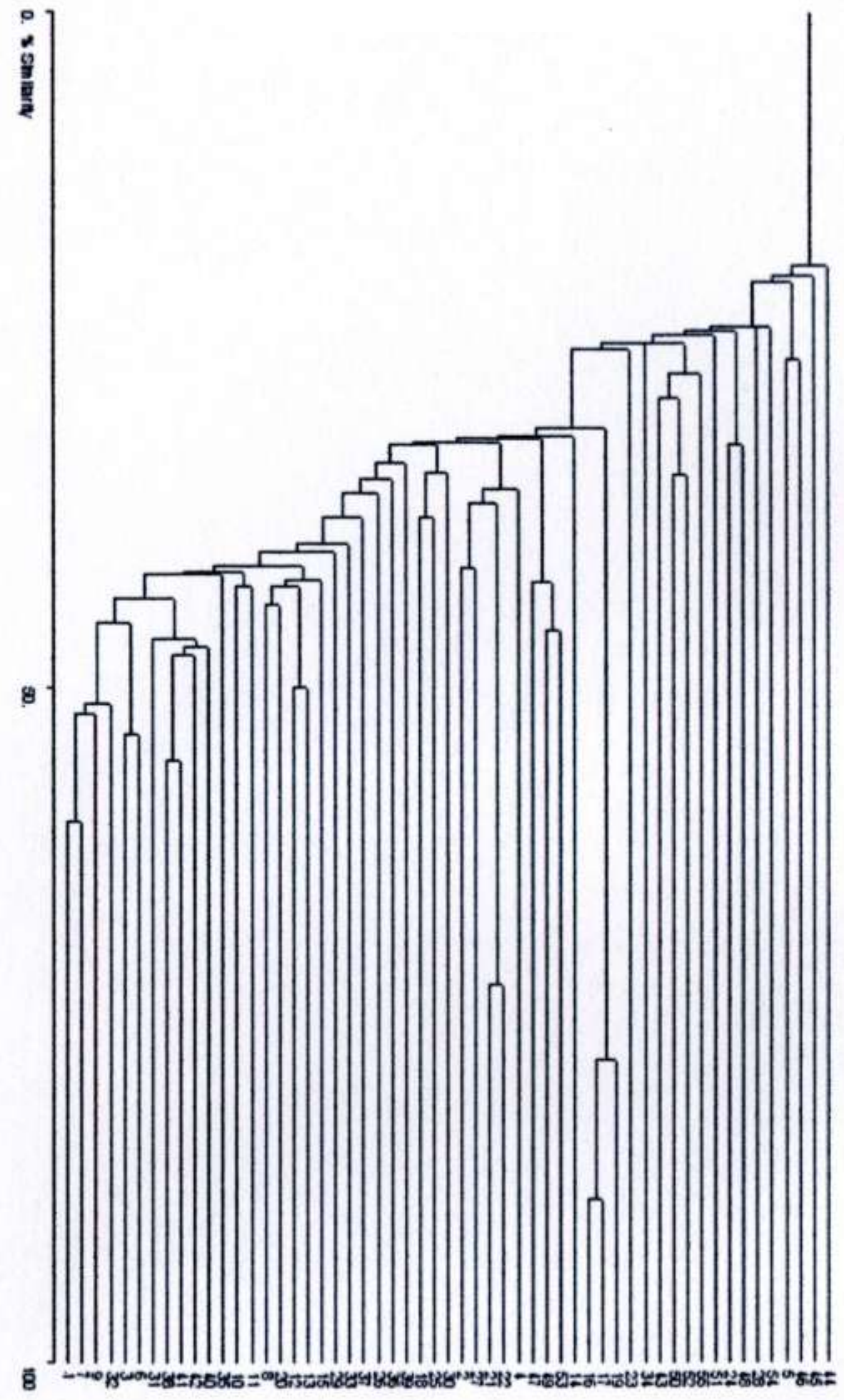
Table 5 The texture of soil samples collected from forest patches near Fingira and Juniper.

Location	Texture
Fingira 1	organic clay
Fingira 2	Silty loam
Fingira 3	Silty clay
Fingira 4	Silty clay
Junip 1 out	Peaty loam
Junip 1 in	Peaty loam
Junip 2 Out	Organic clay loam
Junip 2 In	Organic clay loam

For the list of species found in each area see appendices I to IV.

A Bray-Curtis single linkage cluster analysis was carried out on all of the sites sampled. This compares the number of species and similar species in each site.

Figure 5 Bray-Curtis single linkage cluster analysis



The cluster analysis showed three main types of plant community, these are described in table 6.

Table 6 Main plant community types.

Community type	Typical species	Conditions	soil
Grassland	Co dominance of *Themeda triandra* and *Hyparrhenia cymbaria. Helichrysum kirkii* also present	High exposure, high light,	pH 5-6.5 texture: (silty) clat loam
Scrub	*T. triandra* and *H. cymbaria* present but not abundant. Often dominated by *Loudetia simplex* or *Pteridium aqulinum*	Generally more sheltered, less exposure.	pH 4.5- 5.5 Texture Silty clay loam
Miscellaneous	Many species present but not dominant	Higher % of bare earth, Often dense canopy cover	pH Variable Often organic

DISCUSSION

The soil found in the areas tested was predominantly loamy with no extremes of sand or clay. This type of soil is useful to plant species as it has, both, good drainage and water retention properties. Many of the soils, especially those found in forest patches or Dambo regions had a noticeably high organic fraction. A lot of organic matter in a sample has the affect of aggregating sandy soils (DEFRA) and reducing the cohesion of clay soils (DEFRA). It also gives a silty feel, which may account for the homogeneity of the texture results. To combat this bias a trained expeditioner, who has understanding of this problem, carried out the textural analysis.

The soil was generally acidic with only a few samples, Sq 2 Fingira area and some of the forest patches being neutral. The acidity of the soils was expected given the amount of exposure on much of the grassland where the rain fall in the wet season and the surrounding topography would make the soil liable to be heavily leeched and also the high organic content of Dambo and forest soils, the decomposition of which, may acidify soils.

The method of vegetation survey was especially successful when used on grassland regions of the plateau. In these areas there was generally only ground flora to survey and with the high percentage of *Themeda triandra* and *Helichrysum cymbaria* in most of them they shared some similarities. This method, however, had some severe flaws and limitations. Firstly, $4x4m^2$ is an extremely small sample area of a $100x100m^2$ plot. It could well be assumed that the plant communities in one area of the plot could be very different to another. This was seen in the results as a number of plants only appeared in one quadrat only. It seems unreasonable to assume that these plants are only found in one 4x4m patch but because such a small area was sampled they were only recorded once. This caused a bias in the results reducing the percentage similarity of plots. Cluster analysis looks at both the number of species and the number of shared species. If there are plants that only appear once then this will have a significant effect on the results. This bias highlights the extreme importance of site selection. The quadrat should most definitely be placed in a representative area of the 100x100m square and the urge to sample interesting, rather than representative areas, suppressed. For example the only thicket or rocky outcrop in a grassland site should be avoided.

When this method of sampling was applied to woodland or forested areas it fell apart completely. There was no accounting for trees so only half a story was told. This again was highlighted in the results. For example plots 11, 12 13 and 14 were all *Brachystegia* woodland and yet plots 11, 12 and 13 were deemed to be more similar to grassland sites, due to the ground flora, than each other. Again forest plots (numbered 40+) showed very little similarity to each other. A universal method, which accounts for multiple strata, needs to be adopted in order to fully understand plant communities. Something similar to the National Vegetation Classification, used in the UK, would work. This method uses 3 concentric quadrats of varying size to sample different strata of a community. For example a large $50x50m^2$ is used to sample trees and the canopy layer, a smaller $10x10m^2$ quadrat is then used to sample the shrub layer, which on the Nyika would include species such as *Protea* and finally a smaller quadrat to sample the ground flora. Alternatively, a transect and quarter method could be used in woodland or forest area and relative abundance could then be calculated.

The species in each sample were ranked as we considered that using percentage cover was inaccurate. Accuracy to 5 or 10% could be hoped for and we accept that, with multiple layers, a figure of greater than 100% cover could be obtained. However in some plots a figure of almost 200% was obtained! Also percentage cover is subjective and often varies tremendously between samplers. Ranking the species in relation to each other addressed most of these concerns. Those species that were dominant were given a score of five and those that were deemed to have a very low percentage cover were given a score of one. This allowed sites to be compared with greater ease. The DAFOR scale, although crude, maybe useful in the future.

It is proposed that the species of the Genus *Helichrysum* could be used as indicator species for community type as they are were only rarely recorded together. The genus is generally restricted to higher altitudes (Bauman 2005) and many inhabit montane grassland. In the investigation, *Helichrysum kirkii,* was found mostly in the sites that were dominated by *T.triandra* and *H.cymbaria.* On this year's expedition, *T. triandra* was found to be the most ubiquitous species of the areas sampled, appearing in over 50% of the 40 quadrats sampled within large mammal plots. This matched almost exactly the distribution of *H. cymbaria. H. Kirkii* was only found within quadrats containing one of these two grasses. The same was observed in 2004, when a completely different area was sampled, Again *H. kirkii* was only found in association with either *H. cymbaria* or *Themeda. triandra* (Patel, 2004).

Other members of the genus *Helichrysum* appear to occupy different habitats and are not frequently found together in a sample. *H*. *longifolia* was found in marginal or scrub land, almost exclusively on the outside edge of evergreen forest patches. It was only recorded twice in the plant quadrats within the large mammal squares. This strongly suggests that it is not a grassland species. This seemed to occupy the same habitats as *Pteridium aquilinum*, which was also found on the outskirts of forest patches. *H. longifolia* was occasionally with found with *H. nudifolium* but not with *H.kirkii* and not in grasslands dominated by *H. cymbaria* and *T.triandra*. This species was almost exclusive to the Zungwara area, only very rarely recorded in samples taken in the Fingira rock area of the park and not at all in the Wovwe valley. It was most often found growing in grassland, where *Loudetia simplex* was dominant. It appears to prefer burnt grassland (Burrows and Willis, 2005). This could account for its week association the *Pteridium aquilinum,* which is often a colonising species after a perturbation.

Helichrysum buchannon was found to be the most abundant species of the *Helichrysum* genus in the regions sampled in 2004 and appeared to associate with several members of the genus *Spermacoce.* It was only recorded once this year in the Fingira area of the park.

Although there are limitations to the methods used, this anecdotal evidence clearly demonstrates that the different members of the genus, *Helichrysum*, occupy different niches and belong to different communities. Their spread, it is presumed, is limited by abiotic factors such as altitude, sunlight and water. If an understanding of thei distribution could be reached then these striking and often abundant plants could be effectively used as indicators of community type.

CONCLUSION

The investigation carried out this year was effective at determining the textural classification and the pH of the soil, which tended to be an acidic loam of pH 5.5 to 6.5. More extremes of pH were found in the evergreen forest patches and could probably be due to the higher percentage of organic matter present. Over 250 plant species were recorded in 50 quadrats in a variety of habitats, including monatane grassland, *Brachystegia* woodland, evergreen forest patches and dambo regions. Evidence from this 2006 expedition and also from 2004 strongly suggest that the distribution of species in the *Helichrysum* genus could be used as indicators for community type and their presence or absence could be used to define the habitat. This assertion requires further investigation.

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APPENDIX I

Plants identified in the Fingira area

Plant name	Sq	pl	% cover	Ra
Artemisia afra	1	1		
Berkheys zeyheri	1	1	2	1
Clematis scabiosifolia	1	1	20	3
Clutia whitei	1	1	2	1
Dombeya burgessiae	1	1	10	2
Eriosema elypticus	1	1	50	4
Helichrysum plantaginifolium	1	1	5	1
Helichrysum kirkii	1	1	10	2
Hyparrhenia cymbaria	1	1	2	1
Inula glomeratus	1	1	5	1
Maytenus	1	1	5	1
Protea welwitchya	1	1	5	1
Spermacoce dibrachiata	1	1	5	1
Stomatanthus africana	1	1	2	1
Themeda triandra	1	1	80	5
Thunbergia lacifolia	1	1	5	1
Andropogon eucomus	1	2	25	3
Argyrolobium africana	1	2	15	2
Eriosema elypticus	1	2	2	1
Parogala imbricata	1	2		
Loudetia simplex	1	2	75	5
Melinis repens	1	2	5	1
Protea angolensis	1	2	5	1
Pteridium aquilinum	1	2	2	1
Stomatanthes africana	1	2	20	3
Dombeya burgessiae	1	3	20	3
Eriosema montanum	1	3	2	1
Hyparrhenia cymbaria	1	3	80	5
Imperata cylindrica	1	3	10	2
Inula glomerata	1	3	2	1
Lippia plicata	1	3	20	3
Melinis repens	1	3	50	4
Psophocarpus ?lancifolius	1	3	10	2
Sonchus erobins	1	3	2	1
Syzygium guineense	1	3	2	1
Croton macrostachyus	1	3		
Brachystegia taxifolia	2	1	5	1
Crassula alba	2	1	1	1
Droogmansia pteropus	2	1	5	1
Eragrostis sp.	2	1	75	5
Loudetia simplex	2	1	50	4
Protea angolensis	2	1	7	2
Vernonia sp.	2	1	5	1
Allophylus africana	2	2	5	1
Arthropteris sp.	2	2	1	1
Brachystegia taxifolia	2	2	10	5
Carex sp.	2	2	15	3
Clematis sp.	2	2	1	1
Nelsonia sp.	2	2	20	3
Syzygium guineense subspecies afro-montanum	2	2	5	1
Albuca sp.	2	3	1	1
Clematis scabiosifolia	2	3	5	1
Dolichos kilimandscharicus	2	3	10	2
Eriosema elypticus	2	3	20	3
Hyparrhenia cymbaria	2	3	50	5
Imperata cylindrica	2	3	30	4
Inula glomerata	2	3	1	1
Lippia plicata	2	3	15	3
Melinis repens	2	3	15	3
Protea petiolaris	2	3	10	2
Psophocarpus sp.	2	3	5	1
Pteridium aquilinum	2	3	10	2
Smilax anceps	2	3	5	1
Themeda triandra	2	3	20	3
Clutia whytei	2	4	5	1
Eriosema elypticus	2	4	45	4
Fadogia sp.	2	4	5	1
Helichrysum kirkii	2	4	15	2
Hyparrhenia cymbaria	2	4	30	3
Imperata cylindrica	2	4	5	1
Inula glomerata	2	4	10	2
Lippia plicata	2	4	5	1
Pimpinella sp.	2	4	1	1
Pteridium aquilinum	2	4	5	1
Themeda triandra	2	4	70	5
Alepidea peduncularis	3	1	20	3
Andropogon eucomus	3	1	5	1
Clutia whitei	3	1	5	1
Dieramma densi	3	1	5	1
Eriosema elypticus	3	1	10	2
Melinis repens	3	1	75	4
Protea angolensis	3	1	5	1
Themeda triandra	3	1	80	5
Albuca	3	2	1	1
Arthropteris petris	3	2	2	1
Berkheys zeyheri	3	2	2	1
Clutia whitei	3	2	4	1
Crotalaria goetzei	3	2	1	1
Cussonia arborea	3	2	1	1
Dombeya burgessiae	3	2	5	1
Droogmansia petiolon	3	2	10	2
Helichrysum kirkii	3	2	10	2
Hyparrhenia cymbaria	3	2	60	5
Imperata cylindrica	3	2	1	1
Inula glomeratus	3	2	15	2
Lippia plicata	3	2	10	2
New Compositae (Sample to Zomba)	3	2	1	1
Ozoroa insignis subsp. reticulata	3	2	5	1
Protea angolensis	3	2	20	3
Themeda triandra	3	2	40	4

Bothriocline longifolia	3	3	5	1
Placostera sp.	3	3	1	1
Cussonia arborea	3	3	1	1
Helichrysum kirkii	3	3	10	2
Helichrysum plantaginus	3	3	5	1
Hyparrhenia filipendula	3	3	5	1
Protea angolensis	3	3	10	2
Rubia sp.	3	3	20	3
Stomatanthes africanus	3	3	1	1
Sopubia ?eminii	3	3	2	1
Themeda triandra	3	3	80	5
Thunbergia lancifolia	3	3	10	2
Becium grandiflorum	3	4	1	1
Bothriocline longifolia	3	4	10	2
Clematis sp.	3	4	1	1
Eriosema ellipticum	3	4	10	2
Helichrysum kirkii	3	4	5	1
Loudetia simplex	3	4	10	2
Monocymbium ceresiiforme	3	4	60	5
Protea angolensis	3	4	10	2
Stomatanthes africana	3	4	3	1
Themeda triandra	3	4	40	4
Thunbergia lacifolia	3	4	5	1
Vernonia sp.	3	4		1
Bothriocline sp.	4	1	10	2
Brachystegia sp.	4	1	4	1
Clematis sp	4	1	5	1
Gnidia kraussiana	4	1	5	1
Crasocephalum sp.	4	1	2	1
Dicoma ?sarifolium	4	1	3	1
Droogomansia pteropus	4	1	1	1
Erica benguelensis	4	1	2	1
Exotheca abyssinica	4	1	10	2
Faurea rochetiana	4	1	1	1
Helichrysum kirkii	4	1	10	2
Indigofera sp	4	1	1	1
Tephrosia ?trinaria	4	1	1	1
Themeda triandra	4	1	60	5
Alectra sessfolia	4	2	5	1
Aspira mossambicensis	4	2	5	1
Bothriocline longifolia	4	2	5	1
Brachystegia boehemii	4	2	3	1
Buchnera sp.	4	2	5	1
Gnidia kraussiana	4	2	20	2
Clematis sp.	4	2	5	1
Dombeya rotundifolia	4	2	5	1
Erica benguelensis	4	2	2	1
Eriosema ellipticum	4	2	5	1
Exotheca abyssinica	4	2	20	2
Helichrysum longifolia	4	2	5	1
Hyparrhenia cymbaria	4	2	5	1
Indigofera sp.	4	2	5	1
Inula glomerata	4	2	2	1
Julbernardia globiflora	4	2	25	3
Monotes africana	4	2	5	1
Protea angolensis	4	2	3	1
Spermacoce dibrachiata	4	2	2	1
Tephrosia?trinaria	4	2	1	1
Themeda triandra	4	2	60	5
Uapaca robynsii	4	2	25	3
Andropogon eucomus	4	3	20	3
				1
Apiacea family	4	3	2	
Bothriocline longifolia	4	3	2	1
Brachystegia spiciformis	4	3	20	3
Brachystegia boehemii	4	3	5	1
Buchnera sp.	4	3	3	1
				1
Camponulaceae family	4	3	4	
Ginidia Kraussiana	4	3	2	1
Crotalaria goetzei	4	3	5	1
Erica benguelensis	4	3	40	5
Erythrocephalum zambesianum	4	3	2	1
Faurea rothiata	4	3	5	1
Faurea saligna	4	3	2	1
Helichrysum nudifolium	4	3	6	1
Indigofera sp.	4	3	1	1
Themeda triandra	4	3	10	2
Vernonia whytiana	4	3	3	1
Becium grandiflorum	4	4	1	1
Brachystegia boehmii	4	4	1	1
Cassia sp.	4	4	2	1
Commelina africana	4	4	2	1
Droogmansia pteropus	4	4	5	1
Exotheca abyssinica	4	4	2	1
Helichrysum buchananii	4	4	1	1
Helichrysum kirkii	4	4	5	1
Loudetia simplex	4	4	40	4
Monotes africana	4	4	25	3
Spermacoce dibrachiata	4	4	2	1
Tephrosia ?trinaria	4	4	2	1
Themeda triandra	4	4	60	5
Uapaca robynsii	4	4	10	2
Zonotriche inamoena	4	4	5	1

APPENDIX II

PLANTS IDENTIFIED NEAR ZUNGWARA

Plants	sq	pl	% cover	Rank	
Aeschynomene africana	1	1			
Bothriocline longipes	1	1	5	1	
Eriosema ?psoraleoides	1	1	1	1	
Exotheca abyssinica	1	1	5	1	
Helichrysum nudifolium	1	1	10	2	
Inula glomerata	1	1	2	1	
Loudetia simplex	1	1	5	1	
Stomatanthes africana	1	1	5	1	
Thesium whytei	1	1	60	5	
Bothriocline longipes	1	2	4	1	
Exotheca abyssinica	1	2	5	1	
Helichrysum nudifolium	1	2	10	2	
Loudetia simplex	1	2	5	1	
Stomatanthes africana	1	2	3	1	
Thesium whytei	1	2	60	5	
Buddleja salviifolia	1	3	30	3	
Helichrysum patulifolium	1	3	40	4	
Hyparrhenia cymbaria	1	3	18	2	
Indiogofera sp.	1	3	5	1	
Loudetia simplex	1	3	10	1	
Panicum sp.	1	3	10	1	
Pteridium aquilinum	1	3	70	5	
Rhynchosia sp.	1	3	6	1	
Rubia sp.	1	3	10	1	
Rubus rigidus	1	3			
Rumex abyssinica	1	3	8	1	
Setaria sphacelata	1	3	10	1	
Tecomaria capensis	1	3	10	1	
Bothriocline longipes	1	4	5	1	
Stomatanthes africana	1	4	5	1	
Thesium whytei	1	4	70	5	
Bothriocline longipes	1	5	6	1	
Carduus sp.	1	5	10	2	
Clematis scabiosifolia	1	5	3	1	
Clematis sp.	1	5	10	2	
Euphoboria depauperata	1	5	1	1	
Exotheca abyssinica	1	5	10	2	
Helichrysum kirkii	1	5	5	1	
Helichrysum splendidum	1	5			
Melinis repens	1	5	50	5	
Spermacocoe dibrachiata	1	5	5	1	
Stomatanthes africana	1	5	5	1	
Themeda triandra	1	5	50	5	
Thunbergia petersiana	1	5	2	1	
Alepidea gracilis	2	1	1		1
Andropogon eucomus	2	1	5		1
Berkheya zeyheri	2	1	2		1
Biophytum nyikensis	2	1	5	1	
Eragrostis sp.	2	1	2	1	
Erigeron sp.	2	1	5	1	
Euphorbia sp.	2	1	3	1	
Exotheca abyssinica	2	1	30	4	
Gallium sp.	2	1			
Helichrysum nudifolium	2	1	3	1	
Hypoxis goetzei	2	1	2	1	
Loudetia simplex	2	1	50	5	
Protea heckmanniana	2	1	1	1	
Spermacoce dibrachiata	2	1	2	1	
Thesium whytei	2	1	4	1	
Eragrostis sp.	2	2	5	1	
Exotheca abyssinica	2	2	50	5	
Helichrysum nudifolium	2	2	1	1	
Hypoxis goetzei	2	2	1	1	
Loudetia simplex	2	2	50	5	
Protea heckmanniana	2	2	1	1	
Stomatanthes africana	2	2	3	1	
Artemisia afra	2	3	40	4	
Asparagus vigatus	2	3	2	1	
Blepharis grandis	2	3	2	1	
Bothriocline longipes	2	3	10	2	
Buddleja salviifolia	2	3	50	5	
Diplolophium buchananii	2	3	10	2	
Helichrysum herbaceum	2	3	3	1	
Hypostes capitata	2	3	1	1	
Imperata cylindrica	2	3	10	2	
Kniphofia grantii	2	3	1	1	
Psoralea sp.	2	3	3	1	
Rhynchosia sp.	2	3	5	1	
Rubia sp.	2	3	5	1	
Rubus sp.	2	3	2	1	
Tecomaria capensis	2	3	25	3	
Vernonia cinerea	2	3	5	1	
Cussonia spicata	2	4			
Cyphostemma sp.	2	4			
Maesa lanceolata	2	4			
Myrica serrata	2	4			
Mystroxylon aethiopicum	2	4			
Nuxia sp.	2	4			
Syzygium guineense	2	4			
Alepidea gracilis	2	5	10	2	
Artemisia afra	2	5	5	1	
Aspargus racemosus	2	5	3	1	
Buddleja salviifolia	2	5			

Clematis simensis	2	5	1	1
Galium sp.	2	5	5	1
Geniosporum sp.	2	5	20	3
Geranium sp.	2	5	4	1
Gerbera sp.	2	5	5	1
Guizotia scabra	2	5	10	2
Helichrysum longifolia	2	5	5	1
Helichrysum setosa	2	5	5	1
Hyparrhenia cymbaria	2	5	5	1
Imperata cylindrica	2	5	10	2
Indiogofera lyallii	2	5	5	1
Inula glomerata	2	5	1	1
Panicum sp.	2	5	10	2
Pteridium aquilinum	2	5	5	1
Setaria sphaecelata	2	5	1	1
Alepidea gracilis	3	1	3	1
Berkheya zeyheri	3	1	10	2
Bothriocline longipes	3	1	5	1
Clutia whytei	3	1	10	2
Droogmansia pteropus	3	1	5	1
Dyschoriste sp.	3	1	2	1
Euphorbia depauperata	3	1	1	1
Geniosporum sp.	3	1	10	2
Gladiolus dallenii	3	1	1	1
Gloriosa superba	3	1	1	1
Inula glomerata	3	1	3	1
Leonotis ?jovis	3	1	10	2
Melinis repens	3	1	2	1
Rhus longipes	3	1	1	1
Themeda triandra	3	1	50	5
Trichodesma physaloides	3	1	3	1
Vernonia cinerea	3	1	3	1
Andropogon eucomus	3	2	10	2
Bothriocline longipes	3	2	5	1
Clematis scabiosifolia	3	2	5	1
Helichrysum nudifolium	3	2	5	1
Loudetia simplex	3	2	20	3
Melinis repens	3	2	10	2
Parinari curatellifolia	3	2	50	5
Stomatanthes africana	3	2	5	1
Artemisia afra	3	3	10	2
Berkheya zeyheri	3	3		
Blumea alata	3	3	2	1
Bothriocline longipes	3	3	5	1
Buddleja salvifolia	3	3	10	2
Cyphostemma sp.	3	3	2	1
Diplolophium buchananii	3	3	2	1
Dombeya burgessiae	3	3	20	3
Dombeya rotundifolia	3	3	2	1

Euphorbia (Sample to Zomba)	3	3	2	1
Heteromorpha trifoliata	3	3	1	1
Hyparrhenia cymbaria	3	3	20	3
Hyparrhenia rufa	3	3	5	1
Ipomoea sp.	3	3	2	1
Lippia sp.	3	3	5	1
Psorospermum sp.	3	3	10	2
Rhoicissus tridentata	3	3	30	4
Rhus longipes	3	3	50	5
Rumex abyssinica	3	3	2	1
Solanum sp.	3	3	2	1
Tecomaria capensis	3	3		
Thunbergia alata	3	3	2	1
Aeollanthus sp.	3	4	3	1
Albuca sp.	3	4	1	1
Alepidea gracilis	3	4	5	1
Andropgon eucomus	3	4	80	5
Arthrospermum sp.	3	4	4	1
Berkheya zeyheri	3	4	5	1
Blumea alata	3	4	5	1
Bothriocline longipes	3	4	5	1
Buddleja salvifolia	3	4	5	1
Clematis scabiosifolia	3	4	2	1
Helichrysum herbaceum	3	4	10	2
Heteromorpha trifoliata	3	4	5	1
Kniphofia sp.	3	4	2	1
Melinis repens	3	4	10	2
Pentasia (Sample to Zomba)	3	4	6	1
Protea angolensis	3	4	5	1
Spermacocoe dibrachiata	3	4	5	1
Stomatanthes africana	3	4	5	1
Themeda triandra	3	4	20	3
Trichodesma physaloides	3	4	1	1
Inula glomerata	3	5	5	1
Themeda triandra	3	5	5	1
Bothriocline longipes	3	5	5	1
Melinis repens	3	5	5	1
Clematis scabiosifolia	3	5	2	1
Hyparrhenia cymbaria	3	5	5	1
Tecomaria capensis	3	5	2	1
Blumea alata	3	5	5	1
Stomatanthes africana	3	5	3	1
Pteridium aquilinum	3	5	50	5
Blepharis grandis	3	5	40	4
Helichrysum setosa	3	5	5	1

APPENDIX III

PLANTS IDENTIFIED NEAR WOVWE

Plant	sq	pl	% cover	rank
Brachystegia allenii	1	1		
Annona senegalensis	1	1		
Asparagus racemosa	1	1		
Brachystegia floribunda	1	1		
Combretum collinum	1	1		
Combretum molle	1	1		
Desmodium repandum	1	1		
Dolichos kilimandscharicus	1	1	2	1
Droogmansia pteropus	1	1	28	3
Hyparrhenia cymbaria	1	1	50	5
Inula glomerata	1	1	2	1
Themeda triandra	1	1		
Vernonia (sample to Zomba)	1	1	2	1
Eriosema affine	1	2	5	1
Erythrocephalum zambesianum	1	2	1	1
Gnidia glauca	1	2	2	1
Helichrysum herbaceum	1	2	10	2
Hyparrhenia cymbaria	1	2	20	3
Inula glomerata	1	2	10	2
Maytenus buchanannii	1	2	2	1
Protea sp.	1	2		
Pterocarpus angolensis	1	2		
Temnocalyx obovata	1	2	2	1
Themeda triandra	1	2	80	5
Brachystegia floribunda	1	3		
?Crepisephala mossambicensis	1	3	5	1
Desmodium repandum	1	3	5	1
Dicoma sessiflora	1	3	5	1
Dolichos kalimandscharicus	1	3		
Droogmansia pteropus	1	3	20	3
Erythrocephalum ?thunbergsiana	1	3		
Helichrysum kirkii	1	3	20	3
Hyparrhenia cymbaria	1	3	10	2
Indigofera lyallii	1	3	2	1
Inula glomerata	1	3	5	1
Monetes africana	1	3		
Pennisetum unisetum	1	3	10	2
Protea petiolaris	1	3	3	1
Pterocarpus angolensis	1	3		
Temnocalyx obovata	1	3	2	1
Themeda triandra	1	3	10	2
Thunbergia lancifoliaa	1	3	5	1
Vernonia (Sample to Zomba)	1	3	5	1
Annona senegalensis	1	5		
Aspilia mossambiceniss	1	5	5	1
Bridelia mollis	1	5		
Clematis scabiosifolia	1	5	5	1
Combretum molle	1	5		
Dalbergia lactea	1	5		
Dioscorea dumetorum	1	5		
Dombeya ?shumpangii	1	5		
Faurea saligna	1	5	2	1
Imperata cylindrica	1	5	10	2
Inula glomerata	1	5	5	1
Lippia plicata	1	5	10	2
Smilax kraussiana	1	5	5	1
Andropogon eucomus	2	1	50	5
Arthrixia rosa	2	1	5	1
Clematis scabiosifolia	2	1	5	1
Clerodendrum myricoides	2	1	5	1
Combretum fragrans	2	1	5	1
Dolichos kilimandscharicus	2	1	5	1
Eriosema affine	2	1	5	1
Helichrysum Sample to Zomba)	2	1	3	1
Helichrysum kirkii	2	1	10	2
Heteromorpha trifoliata	2	1	2	1
Inula glomerata	2	1	10	2
Lightfootia ?variegata	2	1	3	1
Lippia plicata	2	1	5	1
Protea petiolaris	2	1	5	1
Spermacoce dibrachiata	2	1	2	1
Themeda triandra	2	1	50	5
Thesium whytei	2	1	4	1
Thunburgia lancifolia	2	1	5	1
Acalypha sp.	2	2	1	1
Aspillia mossambicensis	2	2	4	1
Blepharis grandis	2	2	2	1
Brachystegia spiciformis	2	2		
Catha edulis	2	2	5	1
Clematis scabiosifolia	2	2	1	1
Dolichos kilimandscharicus	2	2	3	1
Droogmansia pteropus	2	2	5	1
Helichrysum kirkii	2	2	10	2
Heteromorpha trifoliata	2	2	3	1
Hyparrhenia cymbaria	2	2	5	1
Hypoestes forssakaolii	2	2	10	2
Imperata cylindrica	2	2	1	1
Inula glomeratus	2	2	3	1
Lightfootia ?variegata	2	2	1	1
Lippia plicata	2	2	1	1
Rhus longipes	2	2	2	1
Tecomaria capensis	2	2	10	2
Themeda triandra	2	2	5	1
Uapaca kirkiana	2	2	1	1
Vernonia sp.	2	2	10	2
Aeschynomene sp.	2	3	1	1

Clematis scabiosifolia	2	3	1	1
Cryptosephalum maraviense	2	3	2	1
Dalbergia nitidula	2	3	2	1
Dicoma sessiflora	2	3	4	1
Droogmansia pteropus	2	3	1	1
Erythrocephalum zambesianum	2	3	2	1
Eriosema affine	2	3	3	1
Helichrysum kirkii	2	3	5	1
Imperata cylindrica	2	3	1	1
Indigofera lyallii	2	3	1	1
Inula glomerata	2	3	5	1
Monotes africana	2	3		
Pycnostachys ?stamminiana	2	3	1	1
Themeda triandra	2	3	10	2
Thunbergia lancifolia	2	3	1	1
Uapaca kirkiana	2	3		
Vernonia (Sample to Zomba)	2	3	1	1
Becium grandiflorum	3	1	2	1
Blumea alata	3	1	5	1
Brachystegia floribunda	3	1	10	2
Clematis scabiosifolia	3	1	5	1
Crytosepalum maraviense	3	1	5	1
Dolichos kilimandscharicus	3	1	5	1
Erythrocephalum zambesianum	3	1	5	1
Galium sp.	3	1	2	1
Helichrysum nudifolium	3	1	5	1
Hyparrhenia cymbaria	3	1	30	4
Indogofera lyallii	3	1	3	1
Inula glomerata	3	1	5	1
Lippia plicata	3	1	5	1
Melinis repens	3	1	20	3
Tephrosia (Sample to Zomba)	3	1		
Tephrosia ?trinerra	3	1	10	2
Themeda triandra	3	1	70	5
Uapaca kirkiana	3	1	10	2
Acalypha ornata	3	2	5	1
Annona senegalensis	3	2	50	5
Crotalaria natalitia	3	2	5	1
Desmodium repandum	3	2	20	3
Dicliptera sp.	3	2	50	5
Hyparrhenia cymbaria	3	2	30	4
Indigofera lyallii	3	2	3	1
Lippia plicata	3	2	20	3
Rhus longipes	3	2	5	1
Smilax kraussiana	3	2	10	2
Themeda triandra	3	2	20	3
Blumea alata	3	3	5	1
Brachystegia floribunda	3	3		
Crotalaria ?erecta	3	3	5	1
Cussonia sp.	3	3	2	1
Droogmansia pterocarpus	3	3	5	1
Eriosema affine	3	3	2	1
Erythrocephalum zambesianum	3	3		
Helichrysum kirkii	3	3	3	1
Hyparrhenia cymbaria	3	3	70	5
Indigofera lyallii	3	3	10	2
Inula glomerata	3	3	5	1
Pennisetum unisetum	3	3	5	1
Tephrosia ?trinerra	3	3	3	1
Themeda triandra	3	3	5	1
Thunbergia petersiana	3	3	5	1
Uapaca kirkiana	3	3		
Vernonia (Sample to Zomba)	3	3	5	1
Alepidia gracilis	3	4	5	1
Bothriocline longipes	3	4	5	1
Brachystegia floribunda	3	4		
Brachystegia longifolia	3	4	10	2
Crotolaria natalitia	3	4	50	4
Crytosepalum maraviense	3	4	15	2
Cussonia sp.	3	4	5	1
Eriosema affine	3	4	5	1
Erythrocephalum zambesianum	3	4	5	1
Helichrysum kirkii	3	4	10	2
Hyparrhenia cymbaria	3	4	30	3
Hypoestes forssakaolii	3	4	5	1
Indigofera lyallii	3	4	10	1
Inula glomerata	3	4	5	1
Lippia plicata	3	4	5	1
Tephrosia ?trinerra (Sample to Zomba)	3	4	5	1
Themeda triandra	3	4	60	5
Uapaca kirkiana	3	4	50	4
Becium grandiflorum	3	5	10	2
Bothriocline longipes	3	5		
Brachystegia floribunda	3	5		
Crytosepalum maraviense	3	5	10	2
Cyphostemma sp.	3	5	1	1
Eriosema affine	3	5	10	2
Erythrocephalum zambesianum	3	5	5	1
Faurea saligna	3	5	10	2
Helichrysum kirkii	3	5	50	5
Hyparrhenia cymbaria	3	5	40	4
Inula glomeratus	3	5	5	1
Monotes africana	3	5		
Pennisetum unisetum	3	5	10	2
Pterocarpus angolensis	3	5		
Tephrosia ?trinerra (Sample to Zomba)	3	5	10	2
Themeda triandra	3	5	60	5
Thunbergia petersiana	3	5	5	1

APPENDIX IV

PLANT SPECIES FOUND IN EVERGREEN FOREST PATCHES

Plant species identified inside forest 1, Fingira area. 6985 =/- 56ft. 10°43.515 S, 33°47.623 E

Species	DBH (cm)	% cover	rank
Allophyllus africanus	67		
	37+3		
	2+1.5		
	5+6		
	42+2		
	2+68		
	+24+		
	18		
	12+3		
Clerodrendrum sp.	10		
	1.2		
Bersama abyssinica	22+2		
	6+32		
	22+8		
	24		
Olinia rochetiana	12+3		
Cyperus sp.		50	5
?Nelsonia canescienis		30	3
Bersama abyssinica		20	2
Clerodendrum		2	1
Stephania abyssinica			
Kalenchoe sp.			
Heteromorpha trifoliata			

Plant species identified on the outside edge of forest 1, Fingira area

Species	DBH (cm)	% cover	rank
Abutolon sp.	5	2	1
Argyrolobium sp.		3	1
Artemisa afra	6.5	20	3
Blepharis grandis		5	1
Buddlia salvifolia	9		
?Cosmosa		15	3
Cyperus sp.		3	1
Dombeya burgessiae	10	15	3
Galium sp.		5	1
Geniosporum		20	3
Helichrysum longifolia		15	3
hyperenia cinbera		4	1
leonotis nepetalis		60	5
Nelsonia canescienis		60	5
Panicum		13	2
Pteridium aquilinum		7	1
Vernonia adoensis		20	3

Plant species identified inside forest 2, Fingira area. 7206 +/- 64ft, 10° 43.231 S, 33° 48.126 E

Species	DBH (cm)	% cover	rank
Myrica serata	58		
	133+110		
Nuxia oppositia	+24		
Sysigium guinnensis	46		
	10		
	9		
	7		
	9+6		
	6		
	5		
Cissus	2		
	18+7		
	+16		
Keetia	+12+13		
	10		
Diospyros ?zombensis	4		
Ochna holstii			
Arthopteris sp.		5	1
Maesa lanceolata		5	1
Asparagus africanus		1	1
Acalypha sp.		10	2
Anisotes sp.		1	1
Nuxia sp.		1	1
Diospyros ?zombensis		1	1

Plant species identified on the outside edge of forest 2, Fingira area. 7282ft 10°43.115 S, 33° 48.085 E

Species	DBH (cm)	% cover	rank
Argyrolobium sp.		5	1
Artemisia afra		20	2
Blepharis grandis		5	1
Buddleja sarlviilifolia		2	1
Blumea alata		3	1
Dombeya burgessiae		6	1
Dyschoriste sp.		5	1
Guizotia scabra		1	1
Helichrysum longifolia		30	3
Indigofera sp.		3	1
Knophifia sp.		5	1
Pteridium aquilinum		60	5
Solanum nigrum		10	2
Spermannia ricinocarpa		15	2
Stephania abyssinica		3	1
Themeda trianda		20	2

Plant species identified inside forest 3, Fingira area. 7129=/- 31ft, 10° 43.119 S, 33° 47.835 E

Species	DBH (cm)	% cover	rank
Buddeja saliciifoilia	27		
Psydrax whytei	5+8+7		
Diosporos zombensis	8+7+5		
Sysygium guineense	409		
Rapania ?megalofloria	5		
	3		
	2		
	6		
Diosporos ?guinensis	8+2+2		
	3+5+2		
	9+10+ 4+5		
Maytenus heterophylla	12		
Adiantum sp.		10	2
Arthopteris sp.		5	1
?Diospyora zombeansis		1	1
Oplismenus sp.		1	1
Panicum sp.		2	1
Rapanea melanophloeos		3	1

Plant species identified on the outside edge of forest 3, Fingira area

Species	DBH (cm)	%cover	rank
Acalypha ?bislo			
Allophyllus africanus		10	2
Ageratum ?hostoniana			
Arthropteris sp.			
Clematis sinensis			
Clutia whytei			
Cyperus sp.			
Diospyros ?zombeansis			
Dissotis princeps	5+6	30	3
Geranium whytei			
Helichrysum longifolia			
Hyparrhenia sp.			
Rubus iringianus		10	2
Stephania abyssinica			
Vernonia porphyrolepis			

Plant species identified inside of forest 4, Fingira area. 7099 =/- 24ft, 10° 43.231 S, 33° 47.825 E

Species	DBH (cm)	%cover	rank
Rapania melanophloes	28		
	34		
	35		
	26		
	30		
	9		
Sysygium cordatum	12		
	16		
Eckbergia sp.	11+21 9+12+4 +7		
Allophyllus chaunostachys	9		
	5+3+ 6+4+4+ 4+3 35+24		
Osyris sp.	+14		
	5		
Diospyros zombensis	10+9+5	5	1
Dissotis princeps		10	1
Pteridium aquilinum		20	2
Adianthum sp.		6	1
Panicum sp.		7	1
Cyperus sp.		10	1

Plant species identified on the outside edge of forest 4 7099 +/- 66ft, 10° 43.231 S, 33°47.825 E

Species	DBH (cm)	% cover	rank
Artemisia afra		15	2
Themeda triandra		60	5
Blepharis grandis		5	1
Dombeya burgessiae		50	4
Pteridium aquilinum		10	2
Indogefera sp.		2	1
Hyparrhenia cymbaria		20	3
Allophylus africanus		2	1
Melinus repens		2	1
Bothriocline longifolia		2	1
Rhynchosia sp. (pink)		2	1
Guizotia scabra		2	1
Leonotis nepetifolia		10	2
Helichrysum longifolia		2	1

Plant species identified inside of forest 5, Juniper area. 7508 =/- 36ft, 10°44.741 S, 33°54.175 E

Species	DBH (cm)	% cover	rank
Myrica sp.	169		
Sysygium guineense	231		
	238		
	129		
	18		
	62		
	52		
	6.5		
Diosporus sp.	4		
Podocarpus sp.	31		
	15		
	4		
	12+7		
Maytenus sp.	53+7+5		
Apodytes dimidiata	52.5		
Psychotria sp.	3.5+10+8		
Rapenia sp.	4.5		
Asparagus africanus		1	1
Cyperus sp.		40	5

Plant species identified on the out side edge of forest 5, Juniper area 7551 =/- 25ft,10° 44.654 S, 33° 54.226 E

Species	DBH (cm)	%cover	rank
Dombeya ?florida			
Cyperus sp.		5	1
Commelina africana		15	2
?Cyanodysum		1	1
Cyperus sp.		20	2
Clausena anistata		15	2
Erica benguelensis		5	1
Eragrostis sp.		20	2
Geranium sp.		2	1
Hebentretia sp.		2	1
Hypericum evolutum		5	1
Impatiens sp.		4	1
Indigofera sp.		2	1
Maesa lanceolata		1	1
Panicum sp.		10	1
Pimpinella ?whytii		1	1
Pteridium aquilinum		40	4
Rhyncosia trifolia		70	5
Sparmannia ricinocarpa		1	1

Plants identified in the inside of forest 6, Juniper area, 7495 +/- 34ft, 10° 44.998 S 33° 54.384

Species	DBH (cm)	% cover	rank
Sysyium guineense	4.5		
	3		
Apodytes dimidata	48		
	27		
Psychotria sp.	2.5		
	3		
	4		
	5.5		
	5.5		
	4		
	5		
Bersama abyssnica	130		
Strychnos sp.	6		
	13		

Plants identified on the outside edge of forest 6, Juniper area

Species	DBH (cm)	% cover	rank
Chrocephalum sp		5	1
Cyperus		20	2
Exotheca abyssnica		10	1
Hebenstretia		10	1
Loudetia simplex		10	1
Psychotria stuhlmannia		20	2
Rhynchosia sp.		40	5
Senecio sp.		15	2
Sonchus ?epens		15	2
Tecomaria sp.		20	2

Plants identified on the southwest edge of Juniper forest. 7308 +/- 35ft, 10° 45.288 S, 33°53.170 E

Species	DBH (cm)	% cover	rank
Acalypha ornata		2	2
Arthrixia sp.		5	1
Bothriocline longifolia		2	1
Clutea whyeii		2	1
Dyschoriste sp.		1	1
Dicliptera sp.		2	1
Euphorbia depauperata		2	1
Helichrysum longifolia		10	1
Helichrysum plantaginifolium		4	1
Hypoestes forskaolii		5	1
Juniperus procera		10	1
Melinus repens		5	1
Maesa lanceolata		30	4
Nuxia sp.		30	4
Pteridium aquilinum		45	5
Tecomaria capensis		10	1
Tephonia sp.		1	1

Plants identified inside of juniper forest. 7300ft 10°45.288 S, 33°53.175°E

Species	DBH (cm)	% cover	rank
Strychnos sp.	227		
	40		
Juniperus procera	471		
	381		
	279		
	325		
	261		
	375		
	279		
Erythroxylum sp.	14.5		
	7		
	11.5		
	13		
	15.5		
	5		
	5		
	14.5		
Nuxia sp.	233		
	50		
?Rauconia luecidia	6		
Asparagus africanus		1	1
Cyperus sp.		1	1
Clausiana aristata		5	1
Hypoestes forskaolii		5	1
Clausina aristata		5	1
Psychotria sp.		5	1
Podocarpus sp.		1	1
Diosporos sp.		1	1

APPENDIX V

Plants identified in Dambo regions

Plants identified in Dambo region 1, Juniper area. 7462 +/- 28ft 10°44.863 S, 33°54.355 E

Species	%cover	rank
Bothriocline sp.	10	1
Carduus sp.	2	1
Cyyphia sp.tree fern	5	1
Cyperus sp.	5	1
Desmodium sp.	5	1
Galium sp.	2	1
Geniosporum sp.	8	1
Guizotia scabra	70	5
Helichrysum sp. (sample taken)	5	1
Leonotis nepetifolia	2	1
?Psorea	20	2
Selago sp.	15	2
Setaria grandis	5	1

Plants identified in Dambo region 2, Juniper area. 6909 +/- 50ft, 10°44.855 S, 33°53.015 E

Species	%cover	rank
Agarista salicifolia		
Allophyllus chaunostachyus	2	1
Asparagus sp.	1	1
Buddleja salviifolia		
Catha edulis	1	1
Clausiana sp.	1	1
Cyperus sp. (big leaf)	10	1
Cyphia dregeana		
Diospyros ?whyteana	2	1
Euphorbia depauperata	1	1
Heteromorpha trifoliata	2	1
Hypoestes forsskaolii	2	1
Ilex mitis		
Kalenchoe sp.	6	1
Liliaceae family	30	3
Lobelia mildbraedii	50	4
Panicum sp.	10	1
Rapanea sp.	3	1
Rhamnus ?riciodes		
Setaria anceps	10	1

Note:

All plant identification has been done by Hassam Patel with transcription by Laura Miller. Inevitably, under expedition conditions, there will be some inaccuracies but all names have been checked against the SABONET Guide for spelling consistency. Reference: BURROWS, J.E.& WILLIS,C.K. (eds) 2005. *Plants of the Nyika Plateau;an account of the vegetation of the Nyika National Parks of Malawi and Zambia.* Southern Africa Botanical Diversity Network Report No. 31 SABONET, Pretoria. Where we have mentioned a Genus not in this guide we place a question mark in front of the genus. This may signify a new species for the park, an old name no longer used, a specimen taken to Zomba for clarification or simply a mis-understanding at the point of writing down the record. Where the genus seems sound but the species does not appear in the guide then the question mark appears in front of the specific name; again the same criteria apply.

No attempt has been made to do ecological analysis with the appendix data at this stage. However, it is hoped that the precise location reference and relative frequency of each species will prove useful for future potential atlas mapping of the park.

Protea spp.

Parogala imbricata

Giant Lobelia

SOME HERPETOFAUNA OF THE NYIKA

Michael Overton

INTRODUCTION

The Nyika is a high plateau 6000-8000ft of rolling country in a fork of the Rift Valley and surrounded by wooded hills. The plateau is largely montane grassland with forest patches, wetland dambos and is well supplied with water in the form of mountain streams and mists. The plateau has an island geography where a number of species have evolved, separated from other highlands in the Central African Arc of the Rift Valley.

Very little herpetology research has been conducted recently in the Nyika except in 1999, when Andy Martin joined the Biosearch expedition (Martin, A., 2000) and a fuller Biosearch study was done in April 2003. (Mazubiko L.C.J., 2004).

METHOD

Searches were carried out at every opportunity throughout the expedition, between 4th July and August 3rd. Habitats searched ranged from urban hotels in Lilongwe, Mzuzu and the Lakeshore, a property 12 km north of Mzuzu, and some of the remote areas of the Nyika National Park. To avoid confusion only records obtained in the Nyika National Park are included in this report. Within the park, inhabited areas included the gate area at Thazima, the "camp" at Chelinda, the hydroelectric station on the Wovwe and the scout houses at Njalayankhunda and Kazuni at Vwase Marsh. Wilderness areas of the Nyika National Park were studied between July10th and 29th inclusive and covered the vicinity of Fingira Rock, Juniper Forest, Zungwara and the Wovwe Valley. Habitats included rocky outcrops, montane grassland, streams and wetland dambos, evergreen forest patches and *Brachytegia* woodland.

Sampling Methods

Sampling of amphibians and reptiles was done during the day and night in different habitats. These habitats included streams, ponds, waterlogged areas, trees and bushes, leaf litter, alongside tracks, under stones and logs, under bark and in cracks and cavities. Strong battery-powered torches were used to sample at night. The main methods in collection were the use of long-handled nets and free hand searching. Once collected, specimens were photographed and released. The author then photographed them. There was insufficient time in any one place to set pitfall traps, corrugated iron or asphalt refuges and this is recommended for a future expedition. Some geckoes and skinks tended to "tame" well, which made them easier to photograph and the skink in Figure 1. is merely "playing dead" to deter predators.

Figure 1. Skink *Mabuya sp.* feigning death

Two tailed Rainbow skink *Mabuya quinquetaeniata margantiter* at Makuzi *Michael scobie*

SKINKS

Rainbow skink *Mabuya quinquetaeniata margantiter* (left and right)

Variable skinks *Mabuya varia* (left and right)

Striped skink *Mabuya striata*

Wahlberg'g snake-eyerd skink *Panaspis wahlbergii*

GECKOES

Turner's thick-tailed gecko *Pachydactylus turneri* Photo 862)

Flat-headed house gecko *Hemidactylus platycephalus (Photo 208)*

Tropical house gecko *Hemidactylus mabouia* (Photo 892)

Day house gecko *Lygodactylus angularis* (Photo 358)

Day house gecko Lygodactylus angularis (Photo 362/367)

Flap-necked chameleons, *Chamaeleo dilepsis*, from near Mzuzu (top left and middle), Thazima (top right) and Njalayankhunda in the Nyika (left).

TOADS

Flat-backed toad *Bufo maculates* (above and right)

Guttural toad *Bufo gutturalis*

SNAKES

Psammophylax variabilis

Roost of a huge African rock python *Python sebae*, with droppings as large as hands

Table 1 Field notes of amphibians and reptiles seen on the expedition

	Species description	**No. and Date**	**Location**	**Photo 1020-**	**IDENTIFICATION**
1	Flap-necked chameleon	2 07/07 08/07	Thazima, nr. gate 5350ft *Brachytegia* woodland Njalayankhunda, bush nr. scout homes 1950ft	326 879-885	Flap-necked chameleon *(Chamaeleo dilepis)*
2	Gecko 6cm long with dark dorsal surface, yellow ventral surface with black "V" shaped markings on ventral side of neck and chin	1 9/07	Fingira Rocky outcrop 6980ft	358, 362, 367	Day gecko *(Lygodactylus angularis)*
3	Skink 15cm long with dull brown dorsal surface and faint lateral stripe of paler colouration	7 13/07-23/07	Fingira and Zungwara Short grassland with patches of bare earth Around 6,500ft	265	Striped skink (*Mabuya striata*)
4	Skinks 15cm long with orange under tail, brown dorsal surface and pale well-defined lateral stripe.	1 9/07	Fingira Dead wood	368/9	Rainbow skink (*Mabuya quinquetaeniata margaritifer*) Male of species 14
5	Lizard 7cm with dark dorsal colouration, slender appearance with elongated abdomen	7 10/07-29/07	Fingira, Juniper, Njalayankhunda Long or short grassland with areas of cut grass or bare earth 2,500-6000ft		*Scelotes spp.*
6	Skink 15cm with sandy colouration, black speckled towards the tail and black lateral stripes. Pale ventral surface.	2 13/07	Fingira Rocky outcrop 6400ft		
7	Skink 15cm Chestnut head, pale dorsal surface becoming darker towards the tail, black speckled towards the tail.	8 18/07-29/07	Juniper, Zungwala & Njalayankhunda Rocky outcrops, bare earth and scattered scrub 2200-6000ft		
8	Snake 30cm skin with the form of a grass snake	2 16/07	Fingira Short grassland 2500-5000ft		*Psammophis sp.*

9	Skink 6cm long with an elongated abdomen and uniform cream dorsal colouration	5 18/07	Juniper & Njalayankhunda Very short grass or cut grass with scattered bare earth 2500-5500ft		
10	Snake dead 36cm long with uniform olive dorsal colouration and black broken dorsal line, pale greenish white ventral colouration	1 14/07	Juniper track Short grassland with scattered bare earth 6300ft		
11	Gecko 6cm diurnal with mottled grey dorsal surface	2 19/07 and 26/07	Juniper and Njalayankhunda Vertical planking in the sun and rotting wood 2500-6300ft	892	Tropical house gecko (*Hemidactylus mabouia)*
12	Skink 15cm long with grey dorsal surface and bluish tail	1 20/07	Juniper Rocky outcrop in evergreen woodland 6200ft		Rainbow skink (*Mabuya margaritifer*) Female of species +6
13	Skink 10-15cm with very dark dorsal colouration and pale ventral surface. One found to be nocturnal.	5 10/07-25/07	Fingira, Juniper, Zungwala, Njalayankhunda Scrub with much bare earth 2100-7000ft		
14	Snake, black or dark	1 13/07	Fingira Short grassland on gentle slope 6800ft		
15	Frog 1.2cm long, red-brown dorsal colouration and grey ventral surface with black longitudinal streaks	1 14/07	Fingira Brachystegia woodland in grass on dry mountain slope 6159ft		*Ptychadena sp.*
16	Skink 15cm uniform chestnut dorsal colouration	2 14/07	Fingira Rocky outcrop 6300ft		
17	Snake 60-80cm Uniform khaki dorsal surface grass snake or	2	Fingira & Zungwala		

	similar form.	15/07 & 23/07	Short grassland and burnt areas, gentle slopes 5500-6500ft		
18	Snake 50cmx1.5cm, dorsal median line of pale kakhi, 3 lines of black delimited scales down the sides and thin, broken black stripes adjacent to the dorsal stripe, orange lateral background	2 15/07-21/07	Fingira and Juniper Short grassland and burnt areas, gentle slopes 5000-7000ft	497, 500	*Psammophylax variabilis*
19	Frog-eating snake	1 30/07	Njalayankhunda In river bank nr, scout houses 1950ft	936-7	Herald Snake (*Crotaphopeltis hatamboeia*)
20	Puff Adder	1 23/07	Vwasa in Kasuni campsite	809	Puff Adder (*Bitis arietans*)
21 a b	Toads	2 26/07 & 27/07	Njalayankhunda nr. water intake & at Wovwe basecamp 4000ft	894 912	Guttural toad (*Bufo gutturalis*) Flat-backed toad (*Bufo maculatus*)
22	Gecko	1 26/07	Njalayankhunda 1950ft	892/3	Tropical house gecko (*Hemidactylus mabouia)*
23	Skink	many 29/07	Njalayankhunda path down to camp 1950ft	913-5	Variable skink *(Mabuya varia)*
24 a b c	Skinks	Many 08/07 & 23/07	Thazima, near park office	778,785/6 321 323	Striped Skink (*Mabuya striata*) Variable Skink (*Mabuya varia*) Wahlberg's Snake-eyed Skink (*Panaspis wahlbergii*)
25	Gecko	1 24/7	Vwasa camp	862	Turner's thick-tailed gecko *(Pachydactylus turneri)*
26	Toad	1 29/07	Njalayankhunda 1950ft	922	

Endemic species

The Nyika Plateau is approximately 750m higher that any of the surrounding highlands (Stewart and Wilson 1966). Above about 6000ft above sea level, most of the Nyika is covered in rolling hills of montane grassland. For this reason, a number of forms have evolved on the plateau and are present restricted to it. No specimens were taken and the known endemic amphibians and reptiles of the Nyika were not confirmed in this survey. More work should be undertaken to assess the status of these important species.

Bufo nyika Nyikae Nyika Dwarf Toad
Hyperolius mertensi Black-striped Sedge Frog
Mabuya hildae Hilda's Skink
Mabuya varia nyikae Nyika Variable Skink
Chamaeleo goetzei nyikae Nyika Chamaeleon
Rhampholeon nchisiensis Dwarf Chamaeleon

Figure 2. *Mabuya sp*. (Photo ref 913)

IUCN Status

Twelve of the 37 threatened amphibians in Central and Southern Africa occur in Malawi and three of these in the Nyika; the endemic France's squeaker *Arthroleptis francei,* the Dwarf toad and the Variable reed frog *Hyperolius pictus,* which is not endemic. Of the 145 species known to occur in Malawi, eight have been classified as threatened, two of which occur in the Nyika, the Dwarf and Nyika chamaeleons. The Nile crocodile is occasionally present in the Vwasa area.

Threats

Outside the protected areas, herpetofauna suffer habitat degradation and loss, road kills and direct exploitation or killing because of alleged medicinal properties, myths or belief that all are harmful.

CONCLUSION

It is clear from the above results that more work still needs to be done to properly document the herpetofauna of Nyika. Nyika has already proved to be rich in herpetofauna (Mazibuko., L.C.J., 2003). The wide range of habitats and level of diversity found in the time spent in the field to date, would suggest that many more reptilian and amphibian species are yet to be recorded in Nyika National Park. Further field trips, using a greater diversity of methods and specifically directed at amphibian and reptilian diversity and their distribution would be likely to yield new records for the Park. In particular, it would be important to discover the status of the endemics believed to occur in the Nyika. This would help promote biodiversity conservation in Nyika and its foothills.

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LARGE MAMMALS

Simone Gentner, Michael Scobie and Jenna Birchall

ABSTRACT

Both plot and transect-based methods were used to collect data on mammal occurrence in the Nyika National Park. A single transect was done at Vwase Game Reserve, for contrast. In the Nyika, four areas were chosen for study, namely Fingira, Juniper Forest, Zungwara and the Wovwe Escarpment. In total 217.8ha was surveyed in detail over 21 days during July 2006. Tracks, signs and/or droppings of 28 large mammal species (over 2kg) were recorded, plus around seven smaller mammal species. Common Duiker, Bushbuck, Bushpig and Porcupine were particularly abundant, and there were sightings of the less common mammals, including Blue Monkey and signs of African elephant. Signs of Buffalo and Greater Kudu were found *only* in Vwase. Surveying plots was found to be significantly more effective at gathering mammal data than conducting transects, although these formed a useful supplement when in transit from one plot to the next. This is the first time that Biosearch has done a scientific mammal survey in the Fingira plateau area. This research highlighted its conservation importance for woodland species.

INTRODUCTION

Nyika is remarkable for its high level of endemism. The area is within the southern end of the Eastern Afromontane Hotspot, a global conservation priority area due to its very large number of endemic species and the extent of degradation (Burgess *et al*., 2006). Thirty-three strictly endemic plants are listed for the Nyika National Park, and a further 13 near-endemics found on the closest afromontane mountaintops (Sabonet, 2005). Several butterfly, amphibian and reptile species are endemic to the Nyika National Park (Johnson 1996).

The habitat on the plateau contains open grassland and relic evergreen forests, which cover 2–4% of the area. Forest patches vary in size and appear mostly at valley heads, on slopes and in hollows. The Juniper forest patches are of particular conservation interest as they represent a very southerly stand in eastern Africa and are vulnerable. The level of endemism is markedly higher in the montane grasslands than in the montane forests (Sabonet, 2005) but the forest patches contain much of Malawi's biodiversity (Dudley, 2005). Six types of forest on the Nyika Plateau have been described. (Dowsett-Lemaire, 1985).

The escarpments of the plateau are predominantly open woodland and make up an estimated 60% of the Nyika National Park. The eastern slopes at Wovwe facing the prevailing southeasterly winds and less than 20km from the lakeshore are clearly wetter, which is reflected in the denser vegetation. The Nyika is also a refuge for game animals and is said to be home to one of the highest concentrations of Leopard in Central Africa, according to Wikipedia, (2006). However, ten years of Biosearch expeditions lead us to suggest that this much-quoted assertion needs treating with caution. Leopards are certainly present but surveying a large nocturnal animal, which leaves few footprints in hard terrain, is difficult. The relatively low game populations would also militate against a high leopard population, notwithstanding that its diet is varied and includes many smaller species.

The Nyika National Park is one of the wild areas of the region that have some measure of protection (Estes, 2001) for their valuable wildlife. One of the greatest threats to the wildlife is fire, as even controlled burning can get out of control, kill trees and threaten the remaining evergreen forests. Poaching activity still occurs although there is now more effective patrolling by game scouts.

IUCN listed large mammals in the Nyika Park include the African Elephant (endangered). Nearby Vwase Game Reserve is home to Elephant, Wild Dog (endangered) and Lion (vulnerable). Chequered Sengi or Elephant Shrew (*Rhynchocyon cirnei*), which is globally vulnerable, is widespread in forested habitats of Malawi. (IUCN)The African Elephant is now confined to the protected areas (Chitaukali, 2005). Cheetah has not been recently recorded in the Nyika (Overton, 1997-2006), but lion was recorded at least in 1998 and 2003 (Overton, 2003,2005), with other anecdotal reports outside the expedition periods.

Nyika National Park also contains the sources of three large rivers: the North Rukuru, the South Rumphi and the Wovwe, and is the most important water catchment area in northern Malawi. Our camps were in the headwaters of each of these rivers during this expedition.

SURVEY AREA

Survey sites were chosen in consultation with the Department of National Parks and Wildlife with a view to combating poaching activity. A priority area this year was at Fingira, to assess the extent of poaching in the southern part of the Park. Most previous studies have been in the northern part of the Park. This was the first time that Biosearch had investigated this Fingira area. Fingira Rock reaches 7000ft at map reference 839080 on the OS Muhuju map, sheet 1033D4.

A connecting road was proposed and started in the remote area between Fingira and Juniper (970115 on the same map). At the time of our visit this track had no bridge crossing the Chelinda River and it ceased at this point. Subsequently, in late 2006 a bridge was put in place, although the through route is not yet complete. This survey provides base-line data on the populations and poaching activity covering this part of the Park.

The Juniper area was chosen because it provides a particular contrasting habitat at high altitude, broadening the range of species recorded. Biosearch previously studied this area in September 1999, when poaching signs were found.

Plots in the montane grassland of Zungwara, which were surveyed in 2005, were resurveyed to determine whether last year's increasing game population results were a one-off or part of a longer-term trend.

The Wovwe escarpment was selected because it had not been surveyed by Biosearch and It is very steep and damp, mainly deciduous woodland on the eastern escarpment of the Nyika Park. We also wished to support the scouts at Njalayankhunda, who are relatively isolated.

As a pilot for possible future work and for comparison with the Nyika, one transect was outside Nyika National Park within the neighbouring Vwase Game Reserve. This lowland area is well patrolled near Kazuni Camp, with good levels of visible game near the lake, which has controlled water levels. Only five miles separate the two protected areas, but the intervening areas are well populated.

From each of the four base camps an area was selected for survey. This area was designed to be manageable in the time scale, but reasonably representative of the area as a whole, covering a range of the habitats. Kilometre squares were randomly selected from within each area.

In the Fingira Area, an area of 7 x 5km was surveyed, within reach of the camp, in which four randomly selected squares of 1km^2 were each surveyed in *Protea* grassland and open woodland habitats, all at high altitude (plot altitude range 6150-6950ft). At Juniper, 6km^2 were surveyed with three randomly selected kilometre squares, two on the plateau and one woodland. At Zungwara, a 100km square was surveyed in 2005. This year in 2006, three kilometre squares on the plateau were selected to be re-surveyed as a comparison to the previous year. Two were close to base camp and one at the south end of the whole survey area, near the edge of the plateau. The Wovwe Valley was very largely woodland and six square kilometres were surveyed using three randomly selected 1km^2 squares. The total area surveyed was 47km^2, plus a section of the 100km^2 surveyed in 2005.

METHOD

Collecting mammal data solely using sightings is not possible due to the huge scale of the landscape and the low visibility of most species, many of which are nocturnal. Using tracks and other signs is the standard method. However, because of the lack of rain, which had made the soil very hard, we had to mostly rely on prints left in the previous wet season, which can make identification difficult. Identification was largely based on knowledge of the trained wildlife officers and scouts, moderated by consultation in the field and by evening group sessions, looking at samples collected during the day and reference books (Apps, P. 1996, Smithers, H. N. 1997, Stuart, C & T 2000). Background information on mammals and tracks and signs were based on Johnson (1991), Ansell and Dowsett (1988) and Walker (1996).

Procedure

The aim was to survey fifty 100x100m (i.e.1 ha) plots over the whole expedition time and the whole expedition area of Fingira, Juniper, Zungwara and Wovwe. We randomly chose map squares of 1 km^2 and within these squares randomly chose 4 to 5 clustered and randomly located plots. This enabled the most time effective collection of data. The methods are described and discussed in Overton (2000). As in previous years, one square was a cliff, impossible to survey safely and had to be discarded. In total from 11 squares, 49 plots were surveyed, which was 4.5% of the selected squares.

Locating random plots *Richard Collins*

Within each plot 10 members of the team walked 100 metres in a line looking 5 metres either side of their path recording all sightings, damage, prints, droppings and other indication of mammal presence. When anything was not clear to the recorder, there was always a scout nearby who could help with the identification. Data was recorded using the Relative Abundance system used on previous Biosearch expeditions: for each plot a total is made of the number of piles of droppings, sightings and calls plus a maximum score of three for each of prints and damage. At the end of each day of survey, the data for each plot were collected on a data sheet. Interesting and unusual findings within the plots despite being “not large mammals” were recorded and mentioned separately. The data sheets also contained information about the habitat, i.e. the proportion of tree canopy, rocks, grass cover, bare ground and if the area was recently burnt or not.

Signs of some species and especially sightings of larger animals were only recorded outside the plots. These data were recorded separately in a species list together with the grid references.

Transect data was collected in the same way, except that the team walked in a straight line looking for mammal signs 10m either side of the line walked, i.e. collecting data in a 20m transect belt. The habitat was recorded with the mammal signs and this information was used to give an approximate length surveyed in each habitat type.

RESULTS AND DISCUSSION

Thirty mammal species were identified and recorded within the plots. Of this total 25 were large mammals and five were smaller species of less than 2kg body weight, including hares, mice, mole rats and shrews. The actual species diversity present is likely to be somewhat higher, as some taxonomic groups could not be separated from their signs alone. This affected larger species to a lesser extent than small mammals, but led to some under-recording, for example all mongooses were grouped as one 'species' as were all genets. Small mammals were recorded when encountered but they are not included in the subsequent analysis.

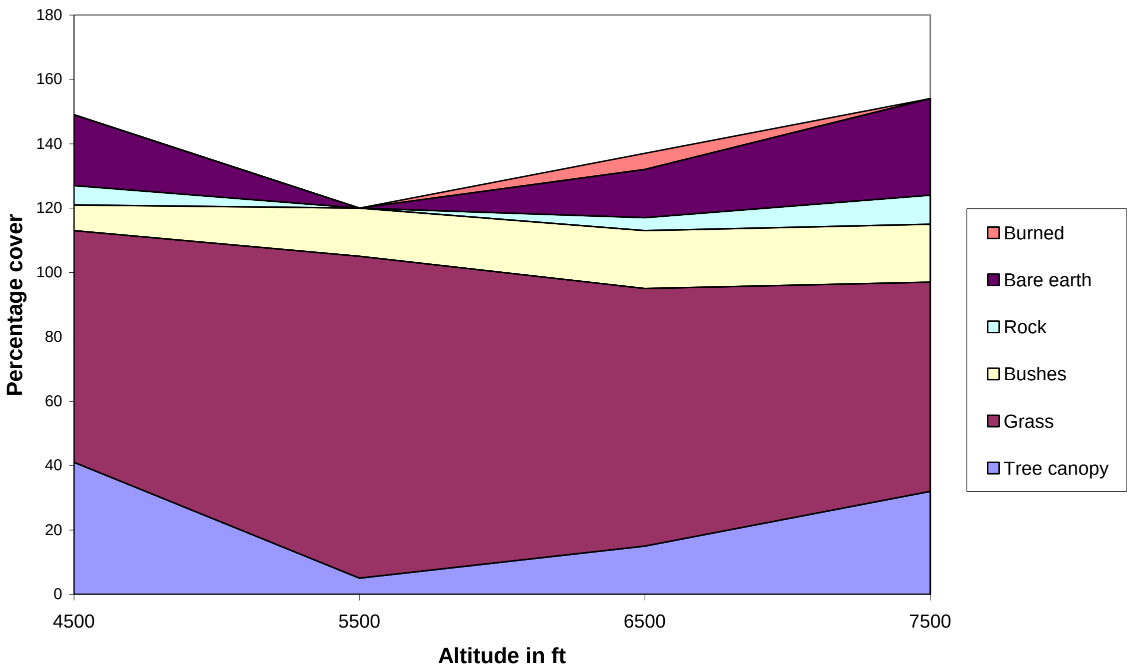
Ground cover

In order to aid interpretation of the large mammal data, we also collected information on topography and ground cover. It can be seen from Figure 1 that the land cover does vary with altitude. The graph demonstrates a central principal of savannah ecology, i.e. a habitat in which trees and grass are the most important components of the vegetation and they are in competition with each other. Bushes make up only a small percentage of the land cover. In total, vegetation provides 120% ground cover over all this altitude range.

The graph was produced using the 48 sets of plot data from mid and high altitude (i.e. over 4000ft) and there was only one plot between 5000 and 6000ft. This plot was on a steep slope, which explains the slightly anomalous data points at 5500ft.

Figure 1 Change in ground cover with altitude

Note that the total land cover does not add up to 100% as there is sometimes more than one layer of ground cover, e.g. when tree canopy overhangs rock. For ease of presenting the results using Excel they are plotted at the mid-point of the category's altitude boundaries, not at the actual mean of the category e.g. there are 24 data sets between 6000 and 6999ft, and these are plotted at 6500ft, but the actual mean altitude is 6615ft.



Species Richness

Table 1 below lists all the large mammal species of which we saw evidence in the surveyed area. For comparison, those found in 2005 are also listed; no species were seen in 2005 that were not seen in 2006. It is clear that more species were recorded this year than on the previous expedition.

This year a total of 217.8ha was surveyed, much higher than the 73ha surveyed in 2005. As one would expect, the total number of species recorded to increase with sampling effort, perhaps a fairer comparison would be to look solely at the plots.

Table 2 shows that fewer plots were surveyed this year compared with last year, and that there was significantly less sampling at lower altitudes and only slightly more sampling at high altitudes (above 6000ft), where scouts patrol to prevent poaching. From this habitat information alone, one would expect fewer mammal species to have been recorded, as the wooded slopes harbour many mammal species, several of which are not found at higher altitudes. However, in total 23 large mammal species were recorded in the plots, compared with last year's total of only 22 species. Further surveying in the lowlands (at less than 4000ft) will undoubtedly reveal more species.

Table 1 Large mammal species recorded by Biosearch Nyika 2006 expedition. Species in italics were sighted by this expedition

English name	***Latin Name***	Recorded on 2005 expedition?
Aardvark	*Orycteropus afer*	✓
African Buffalo (Vwasa)	*Syncerus caffer*	
African Elephant (Vwase)	*Loxodonta africanus*	✓
Blue Monkey	*Cercopithecus mitis*	
Burchell's Zebra	*Equus burchelli*	✓
Bushbuck	*Tragelaphus strepsiceros*	✓
Bushpig	*Potamochoerus porcus*	✓
Civet	*Civettictis civetta*	✓
Common Duiker	*Sylicapra grimmia*	✓
Eland	*Taurotrogus oryx*	✓
Genet	*Genetta spp.*	✓
Greater Kudu (Vwasa)	*Tragelaphus strepsiceros*	
Hippopotamus (Vwasa)	*Hippopotamus amphibius*	
Honey Badger	*Mellivora capensis*	✓
Impala (Vwasa)	*Aepyceros Melampus*	
Side-striped Jackal	*Canus adustus*	
Klipspringer	*Oreotragus oreotragus*	
Leopard	*Panthera pardus*	✓
Mongoose	*Galerella spp.*	✓
Porcupine	*Hystrix africaeaustralis*	✓
Red Forest Duiker	*Cephalophus natalensis*	
Reedbuck	*Redunca arundinium*	✓
Roan Antelope	*Hippotragus equinus*	✓
Serval	*Felis serval*	✓
Spotted Hyaena	*Crocuta crocuta*	
Vervet Monkey	*Cercophitecus aethiops*	✓
Warthog	*Phacochoerus aethiopicus*	✓
Yellow Baboon	*Papio cynocephalus*	✓

Table 2 Number of plots surveyed at different altitudes by the 2005 and 2006 expeditions
High refers to plots over 6000ft, mid includes the range 4-6000ft, and low those below 4000ft.

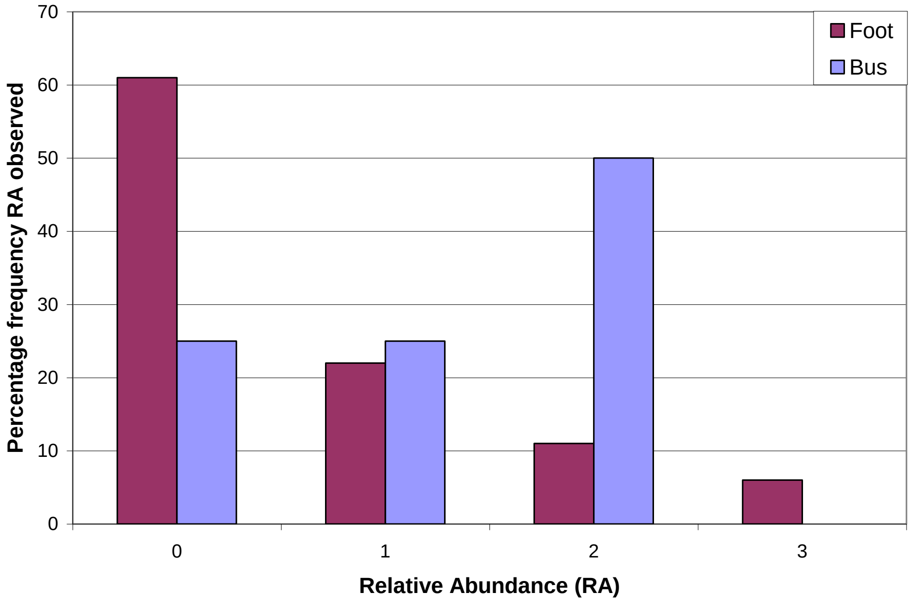
Altitude	2005	2006
High	29	34
Mid	34	14
Low	10	0
Total	73	49

Comparison of results from the two sampling methods

This year two contrasting methods were used; the usual clustered, random plot-based technique as in previous years and for the first time, using long transects en route to and from the plots. Transects are commonly favoured by researchers as they involve continuous data-collection and no detailed plot establishment. However, plots have yielded useful results in the past so we were interested in comparing the results. In total 168.8ha was surveyed by transects, compared with 49ha using plots. The time allocated was similar. So transects are clearly quicker, as would be expected.

A further complication when comparing the data is that much of the transect data was collected from a vehicle. Obviously a long distance can be covered on a road working in this way. However one would expect to observe different signs this way: for example missing smaller tracks but seeing more 'flighty' large game. Figure 2 shows a comparison of Relative Abundance of Common Duiker, the species recorded in the most plots, when recorded on foot and in the bus. The data was standardised by conversion into Relative Abundance per 50 'plots' (=50ha), as has been done in previous Biosearch Nyika reports.

Figure 2 Relative Abundance of Common Duiker observed when collecting data on foot and by bus



It can be readily seen that the recordings on foot follow the expected pattern of a smooth decrease in frequency from RA=0, the most commonly observed abundance. In all 18 transect segments (each with a different habitat) were recorded on foot and a total of 4 by bus. As expected, examination of the data shows that smaller species, such as porcupine and small mammals, are not recorded at all from the bus, as their signs are simply not visible. Moreover when the plot and transect results overall are compared, they give very different relative abundances, as shown in Figure 3.

Figure 3 Comparison of the effectiveness of plots versus transects for mammal data

The ten large mammal species with the highest Relative Abundance scores over the mid and high altitude plots (n=48 plots >4000ft) are shown with Standard Error bars. Transect data based on 22 transect segments, of differing lengths, which have been converted to RA per 50 plot equivalents.

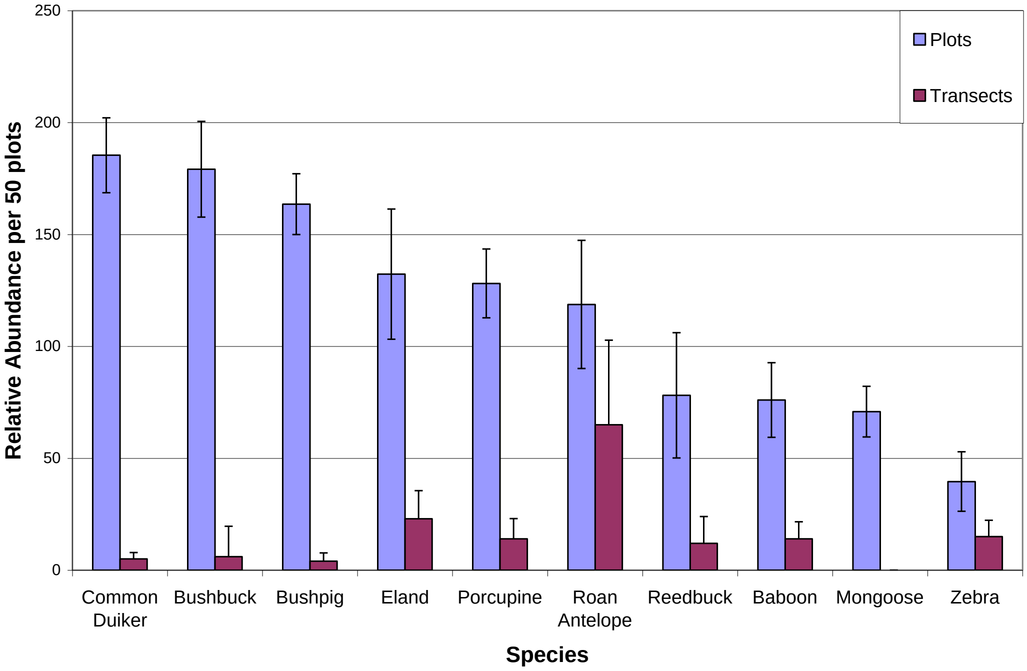


Figure 3 clearly shows significantly lower Relative Abundances were collected from plots versus transects, indeed these bars only overlap for one of the ten most common large mammal species, the Roan Antelope. A paired t-test on this data (2-tailed, unequal variance) indicates that the methods give significantly different results. (The probability that the two data sets were the same is 0.0001.) The lower values for transects are likely to be because it is very easy to miss signs when walking transects. Most of the signs in the plots were prints. There is likely to be a bias towards prominent signs and droppings on the path as the effort of trekking may overwhelm the exercise of collecting scientific data. Also the broader transect belt (20m, compared with 10m) is likely to mean that signs on the edges of the belt are missed because they are passed unnoticed. This transect method would be more appropriate for recording sightings in open landscape when populations are high enough to get sound data for comparison. Prints were conspicuously lacking in the transect data and sightings were a more important part of the Relative Abundance scores in transects compared with plots. However because a larger area can be covered with transects, more species are likely to be recorded. This year the Blue Monkey and Warthog were recorded solely on the transects in the Nyika, which emphasises the importance of collecting anecdotal or transect observations in addition to detailed plot data plots. Buffalo, Hippopotamus, Impala and Greater Kudu were found only on the transect in lowland Vwase, where the transect was a useful means of collecting qualitative data without detailed plots.

The field data is shown in Appendix 1, 2, 3 and 4.

Diversity of large mammals

Species richness, as given in Table 3, is used as a first estimate of diversity but the number of individuals should also be taken into account. Diversity is often referred to as the relationship between richness and abundance. Ideally, diversity indices will take both of these factors into account. The Simpson's Index illustrates diversity. It gives a measure of the probability that any two individuals drawn at random will be different species; the higher the index, the higher the diversity.

Simpson's Index $D = 1 - \sum Pi^2$
Where p_i is the proportion of animals of category species i.
The "1 –" ensures that the index goes up with increasing diversity.

Table 3 Species richness and abundance of individuals in three main survey areas

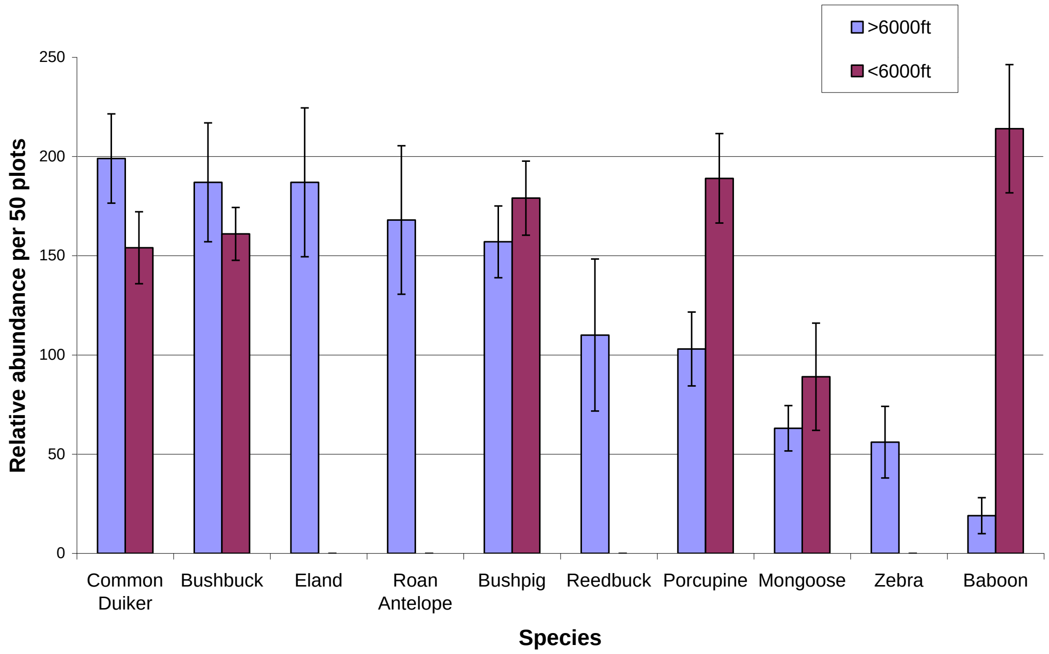
	Total Relative Abundance from plot data		
Species	Fingira	Zungwara	Wovwe
Aardvark	7	0	5
Baboon	9	0	60
Burchell's Zebra	0	38	0
Bushbuck	80	32	45
Bushpig	39	52	50
Cane Rat	14	0	23
Civet	0	1	0
Common Duiker	69	44	43
Eland	23	95	0
Elephant	0	8	1
Genet	2	2	0
Hare	21	23	0
Honey Badger	6	4	6
Hyaena	3	0	0
Jackal	4	0	1
Klipspringer	0	33	3
Leopard	1	0	0
Mole Rat	15	21	30
Mongoose	23	20	25
Monkey	4	0	0
Mouse	61	66	50
Porcupine	21	35	53
Red Duiker	0	0	4
Reedbuck	1	74	0
Roan	11	101	0
Rock Hare	0	31	0
Serval	2	0	0
Shrew	22	19	0
Tree Squirrel	3	1	0
Total	*441*	*700*	*399*
Simpson's Index	0.90	0.92	0.89

Table 3 shows that there is little difference in mammal diversity as shown by the Simpson's Index. The habitats are not identical: high altitude, Protea grassland and cold weather conditions at Fingira, similar altitude at Zungwara but without Protea and with less tree cover, and low altitudes, undulating terrain, partial tree cover and much warmer conditions at Wovwe. It is unsurprising that the species composition varies between the sites.

Figure 4 shows the distribution of the most abundant large mammals recorded in the survey. It can readily be seen that ungulates (hoofed mammals) are more abundant in the higher altitude plots than in those at lower altitude, whereas species such as Porcupine, Mongoose and Yellow Baboon (which are also frequent on settled land) are more abundant at lower altitude. This can partly be explained by their habitat preferences, for example Roan Antelope prefers open grassy areas.

Figure 4 Distribution of the most abundant large mammals in plots at high and mid altitude

Standard Error bars shown. Graph based on 34 plots at high altitude (>6000ft) and 14 plots at mid altitude (4-6000ft). Note that no Eland, Roan Antelope, Reedbuck or Burchell's Zebra were recorded at all in the mid altitude plots. Species are arranged in descending order from the most abundant (Common Duiker) at >6000ft, where the majority of sampling was carried out.



Comparison of survey results from Zungwara in 2005 and 2006

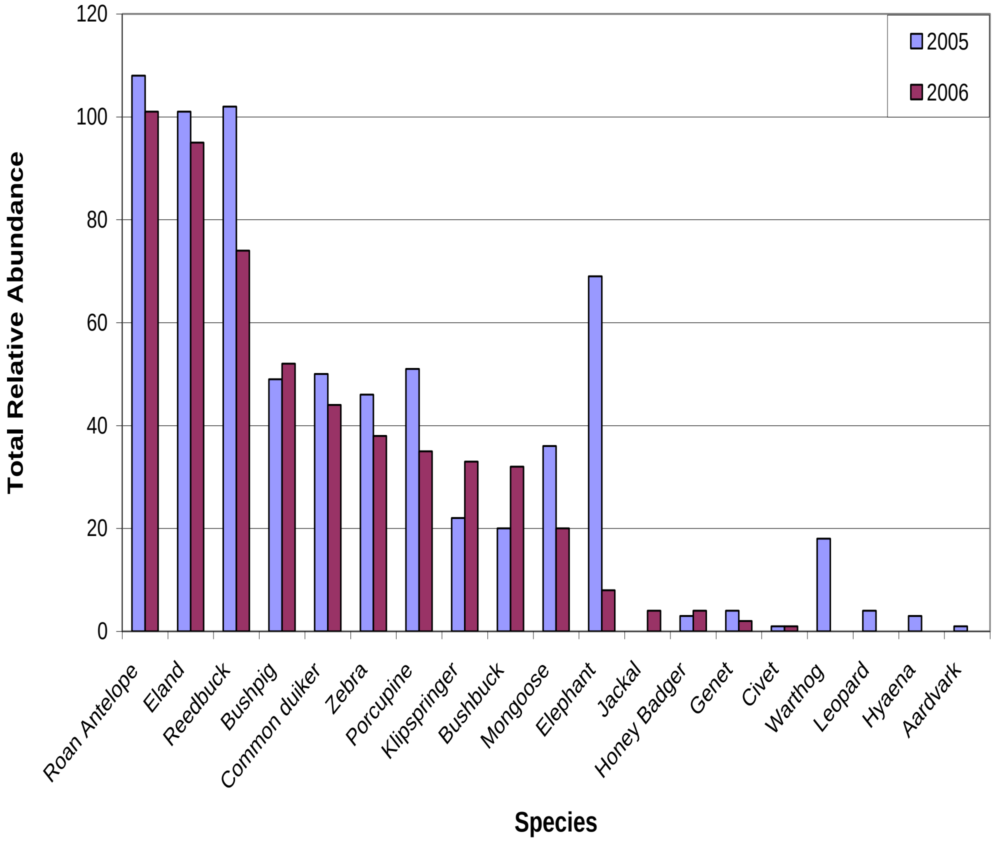
Fifteen plots in three kilometre squares at Zungwara were surveyed in 2005 and resurveyed on this expedition. In 2005 evidence of 18 species was seen in the plots at Zungwara; in 2006 evidence of 15 species was seen. Those not seen during the resurveying were Warthog, Leopard, Hyaena and Aardvark, while Jackal was seen in 2006 but not in 2005. Even with GPS, inaccuracies in navigation means the exact plot positions could vary slightly, but one researcher worked both years enabling some moderation.

For example, from memory, plot 792319 was exactly the same plot, 100% burnt in both years. There was more bare earth recorded on the slope in 2006, which could indicate erosion. Species were similar except that in 2006, there were no visible Elephant herds and four nearby Zebra watched us intently throughout the plot survey!

There was not a significant difference in the total Relative Abundance of all large mammals; for each species for which signs were found in at least one plot in either/both 2005 and 2006. Far more signs of Elephants were seen in 2005 (total RA=69) than in 2006 (total RA=8). The most likely explanation for this is that the elephant herd simply moved on. We know from our own previous work and from reports that the Nyika herd is very mobile and ranges widely.

Figure 5 Comparison of Relative Abundance of large mammals at Zungwara

Data points shown are total Relative Abundances over all 15 plots surveyed n 2005 and 2006. For clarity no error bars are shown.



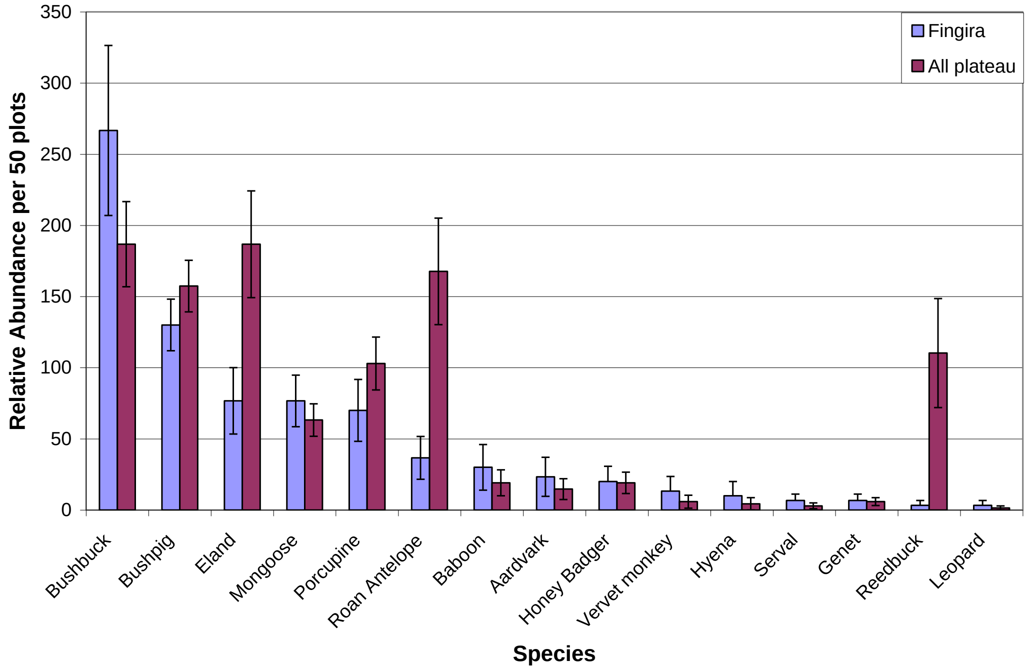
Results from the Fingira area

The plateau around Fingira, in the south of Nyika National Park, was surveyed for the first time this year. One transect of 3km was walked and 15 plots were surveyed, of which 11 were in Protea grassland and 4 in open woodland. When we surveyed the plots in mid July (10-13th) none was burnt. In total we found signs of 15 large mammal species in the plots (shown in fig. 6 below), plus a further three (Common Duiker, Jackal and Burchell's Zebra) were found in the transect. Elephant and Klipspringer were notably absent, although further sampling may well have revealed signs of their presence.

Figure 6 compares the Relative Abundance per 50 plots at Fingira with that overall in the plateau plots surveyed this year. Fingira has a high Bushbuck population (RA of 267+/-60SE per 50 plots) and a sizable population of Bushpig, Mongoose and Porcupine. The population of Eland, Roan Antelope and Bushbuck are notably lower than this year's survey mean, but overall the results are not significantly different (2-tailed paired t-test on the species found at Fingira gave p=0.23).

Figure 6 Comparison of large mammal abundance at Fingira and in all plateau plots surveyed in 2006

Fifteen plateau plots were surveyed at Fingira, and 34 plateau plots overall. Standard Error bars shown on graph.



Trends in species' populations through time

The data collected during the dry season months 1998-2006 is illustrated in Figure 7. Individual species illustrating clear trends are also separately illustrated in the later paragraphs.

Elephant showed a clear decline until 2004, and a rise in 2005 in one area near Zungwara, which was not fully maintained in 2006. This is discussed below.

Bushpig, Bushbuck, Eland, Roan and Porcupine all show an increasing trend since 2004, which was borne out by the increase in herd sizes seen on the plateau and by the large number of young amongst them. Bushbuck and Mongoose populations are erratic, but appear to have an upward underlying trend.

Baboons are adaptable with a varied diet and show a substantial increase, peaking in 2004. A reduction since then could indicate an increase in their predators, such as leopard, which are soft-padded and therefore not well recorded in this study, but also the populations are very mobile. Further study will reveal if this trend is continued.

The survey areas this year included the Fingira and a few plots in the Wovwe areas for the first time. The Wovwe is clearly wetter, even in this dry season, steep and well wooded, but did not contain significantly more evidence of game animals. The choice of survey areas is unlikely to have overwhelmed the underlying trends. Rainfall in the previous year can affect the results (in Overton 2004), possibly by affecting the breeding success.

Figure 8 and 9 distinguish between the populations over time at different altitudes, higher plateau over 6000ft and lower woodland. The trends are generally not significantly different in the two areas. (Mongoose and Common duiker are naturally erratic.) Reedbuck occurs almost exclusively on the plateau and so this is where the reduction in these populations is evident. Future work will reveal if this due to differences in the area surveyed or due to poaching.

Figure 7 Population of most abundant species over the period 1998-2006

Data points on the graph are the mean of all plots (at all altitudes) surveyed that year.

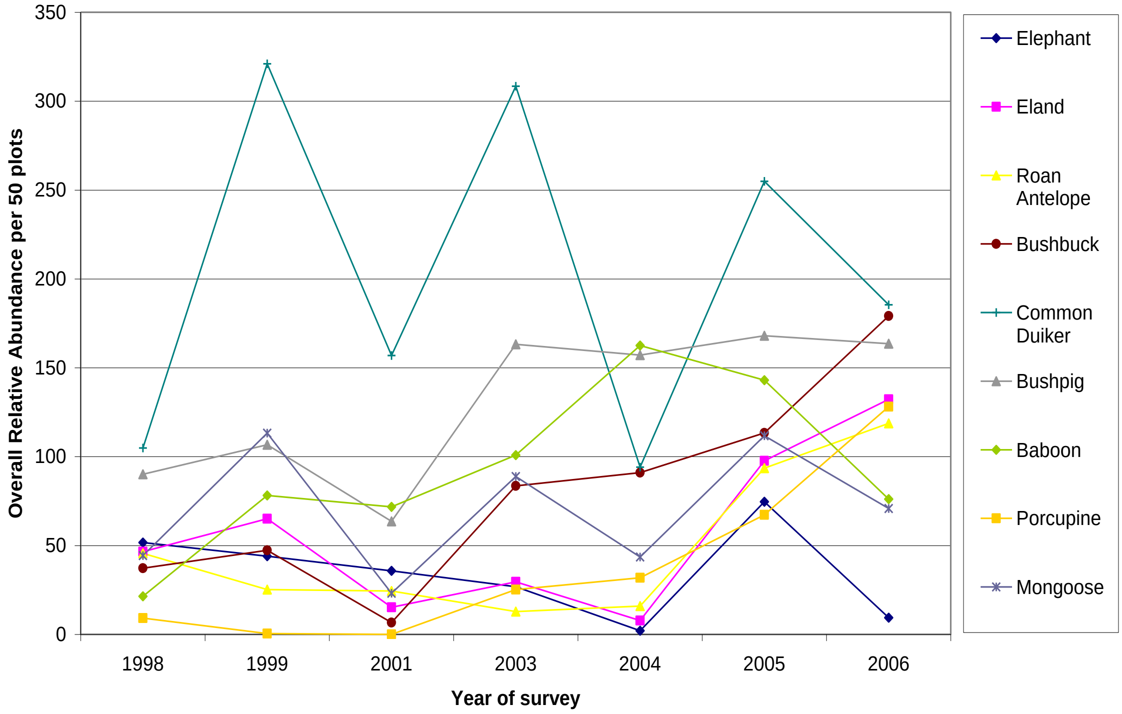


Figure 8 Population of most abundant species over the period 1998-2006 at altitudes of over 6000ft

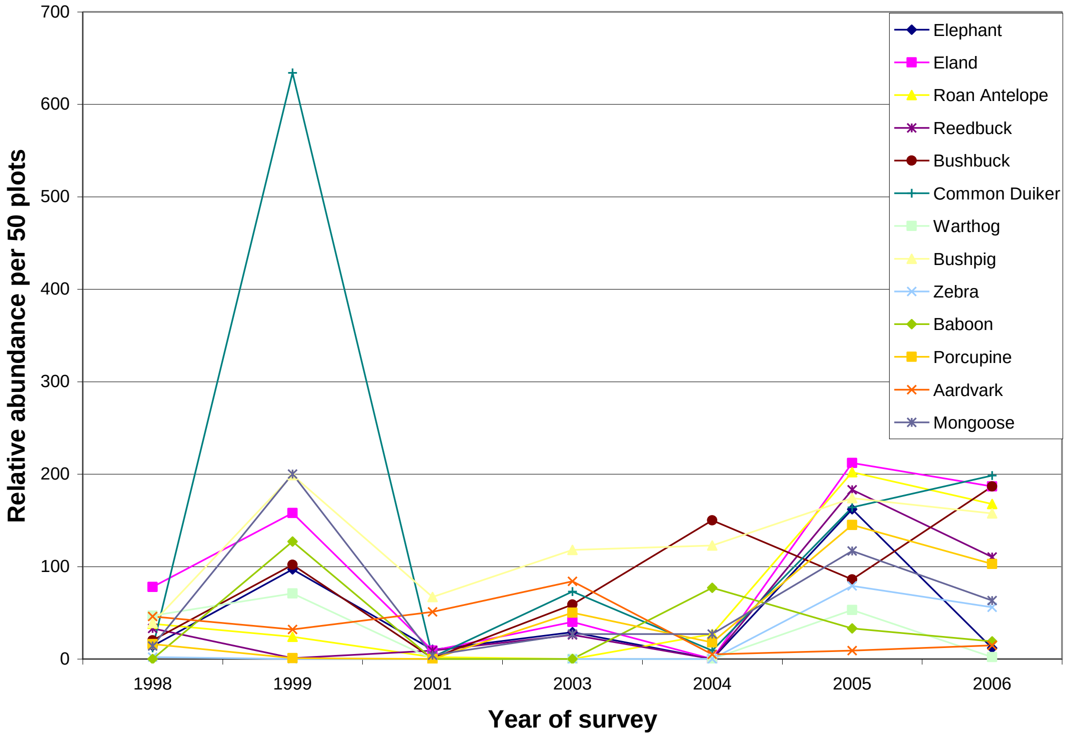
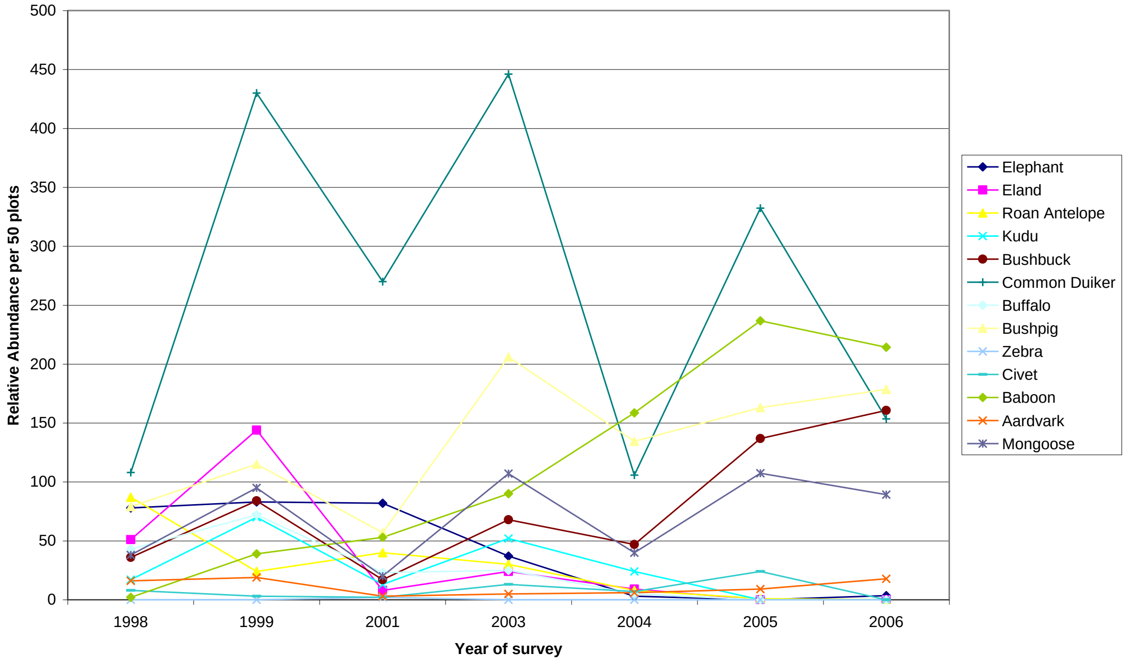


Figure 9 Population of most abundant species over the period 1998-2006 at altitudes of 4000-6000ft



Elephant and Buffalo

Figures 10 and 11 illustrate the status of two of Africa's key "tourist-attracting" species. Their position is precarious, especially that of the buffalo. Of the two, the status of the Elephant in the Nyika National Park is more readily monitored because of its high visibility; by sight or sign and the Park management keeps account of signs and sightings. Signs were found in only four plots in 2006 and 25 plots on the western escarpment over 6000ft in 2005.

In 2005, Biosearch reported seeing two small herds, both in the same valley near Zungwara. There was only one young animal suggesting low breeding success, which might be explained by the reliance on the grass areas on the plateau, which are shorter but better protected by the scouts. In 2006, the elephants were not confining themselves to this area. The herd of nine, seen and photographed in the well protected, lowland Vwasa area, included five young of different ages. One adult carries a radio collar. Controlling the lake levels to ensure year-round water has been an important tool. It is possible for the animals to move from one park to the other across an inhabited and unprotected land, but this is likely to be a reducing occurrence. The Parks plan to provide a corridor would assist, but the Nyika provides variety of habitat and needs protecting.

Elephants lined up for counting at Vwasa *Marianne Overton*

Buffalo may never have been common at the higher altitudes (Ansell and Dowsett 1988); they are a grazing species, which prefers tall grass and good water supply. So in the most suitable parts of the Nyika, further down the escarpments and foothills, they may well be in competition with local cattle, as well as being victims of poachers. Unable to move successfully into the protected highland areas, it seems that Buffalo are sadly diminishing and no signs have been found for two consecutive years. The lower wooded areas need stronger protection.

Figure 10 Elephant population at different altitudes

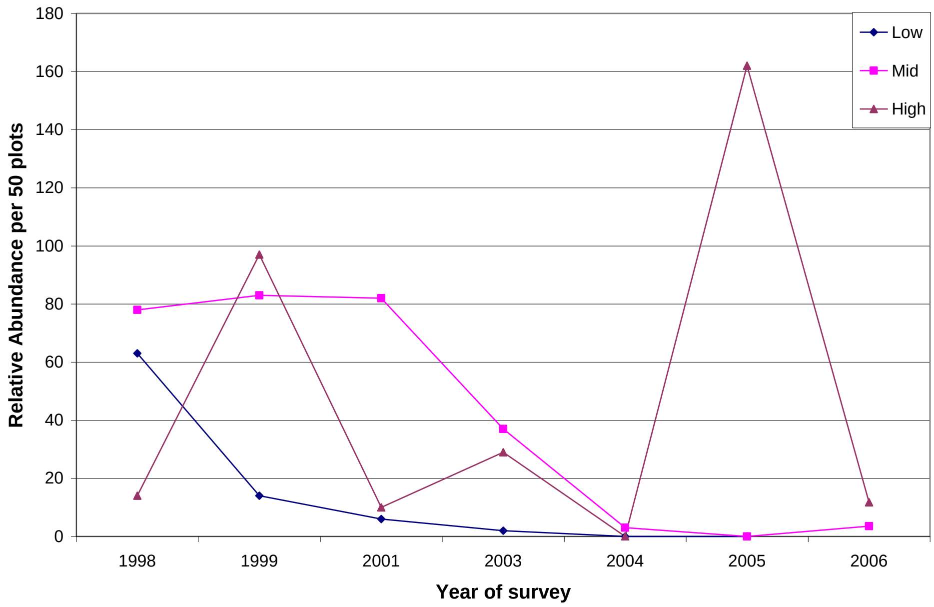
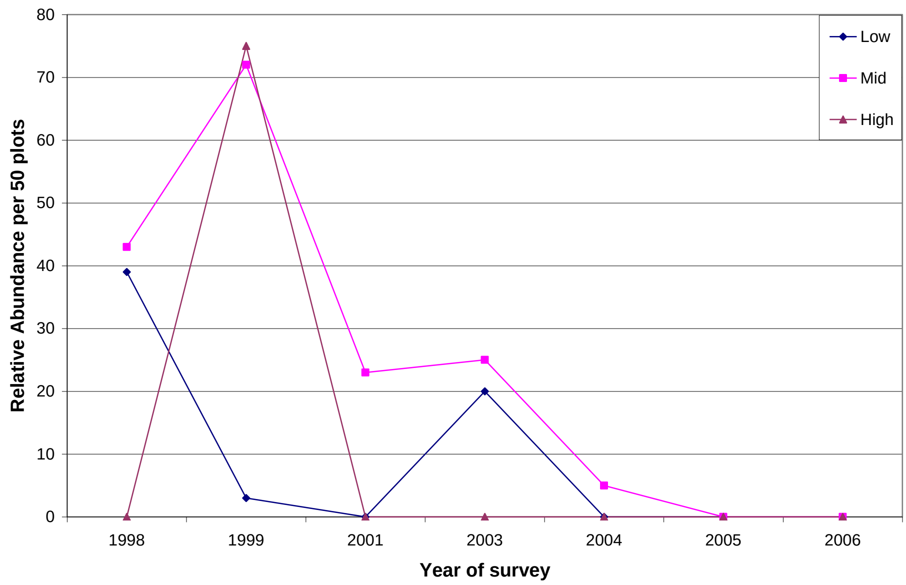


Figure 11 African Buffalo population at different altitudes



Eland

Figure 12 illustrates the activity levels of Eland populations. These follow the same pattern of a declining population at mid and low altitudes, but an increasing population at high altitude. Eland activity was high in the recently burned parts of Zungwara (RA per 50 plots=250), as was expected, but overall the relative abundance recorded in this survey was comparatively low (RA per 50 plots based on all 2006 mid and high altitude data=132). However as the high plateau is now patrolled, it could be that larger mammals are forced to move to the patrolled higher altitudes in order to avoid poachers.

Figure 12 Eland population at different altitudes

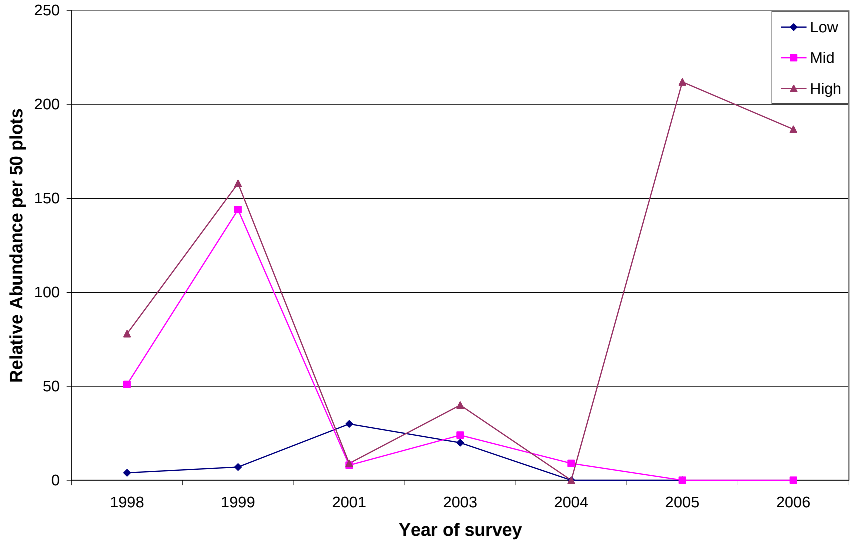


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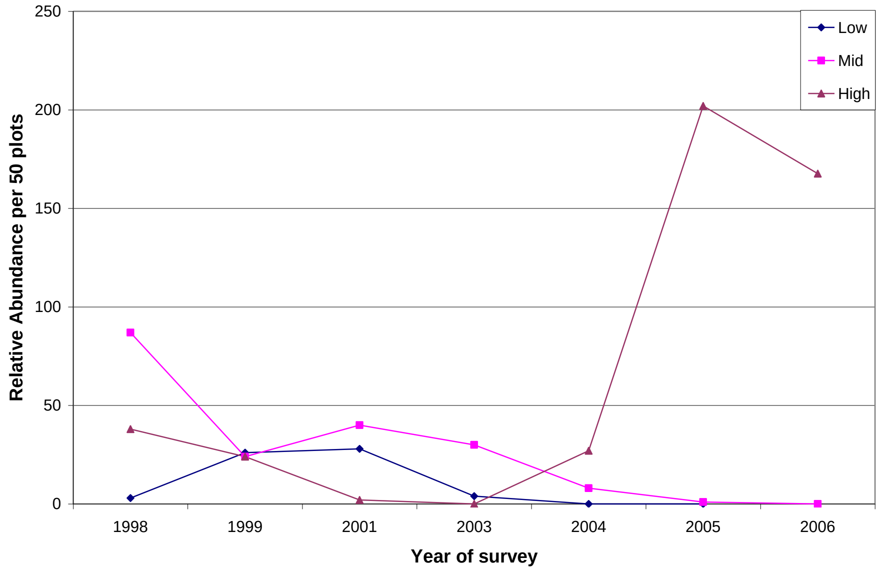
Figure 13 Roan Antelope population at different altitudes



Roan Antelope

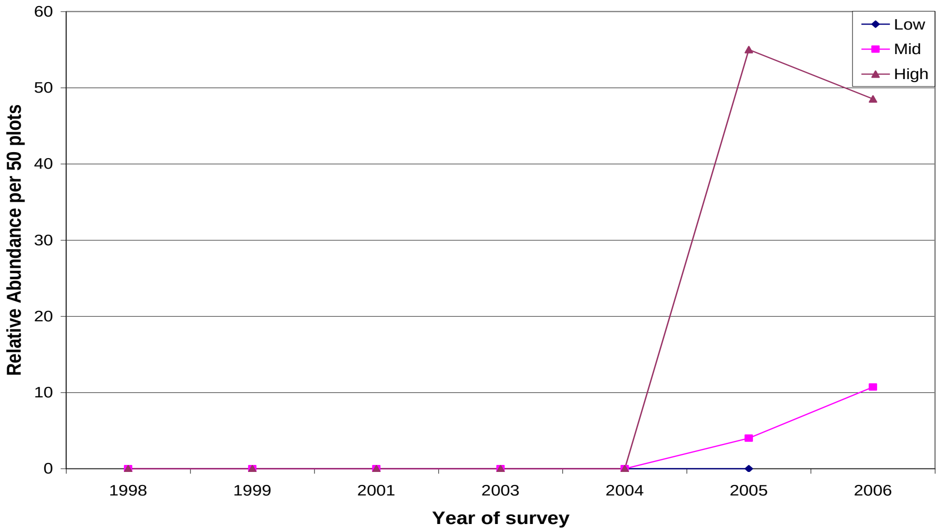
A similar trend is observed for roan antelope (see figure 13), which was a very widespread species in the plots at high altitude, found in 22 out of 29 grass plots over 6000ft that were surveyed. However, no signs were found elsewhere, neither in woodland plots at this altitude, nor in plots and transects at lower altitude. Roan Antelope are mainly grazers and not browsers with a clear preference for the grassland habitat

Klipspringer

The Klipspringer population appears to have increased in recent years, (Figure 14) but this may partly reflect the areas surveyed, because Klipspringers are largely restricted to rocky outcrops. No signs were recorded in the plots between 1998 and 2004, though 92 high altitude plots were surveyed (2001-2004). Prior to 2006, expeditions have worked the

peripheral areas of the Park. In 2005, 1/4 of the high altitude survey plots contained signs of Klipspringer and 1/8th in 2006. It could be that the suitable habitat on the distal Kawozya-Mpanda ridge is so restricted that poachers have largely removed the few that may have had territories there.
The past two years suggest good populations in restricted areas on rocky outcrops at mid and high altitudes on the central part of the plateau.

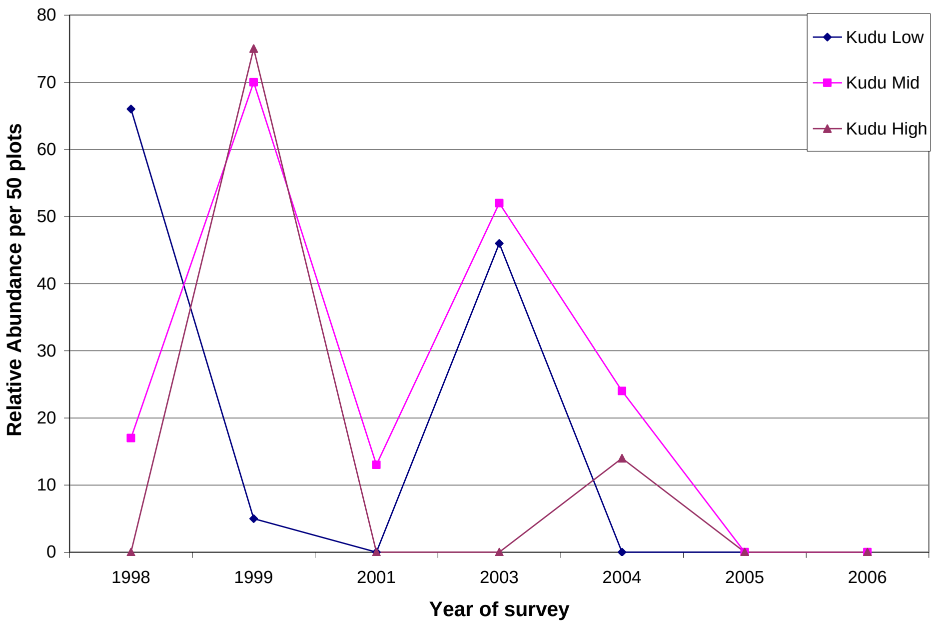
Figure 14 Klipspringer population at different altitudes



Greater Kudu

This species appears to be very scarce over much of the park. No signs were seen in the 2005 and 2006 plots. Kudu are naturally absent from montane areas (Ansell, 1988), but present in woodland at mid and low altitudes. Low altitude areas were not studied in this survey, but nineteen mid altitude plots revealed no sign. Good sightings were made in the well protected areas at Vwasa.

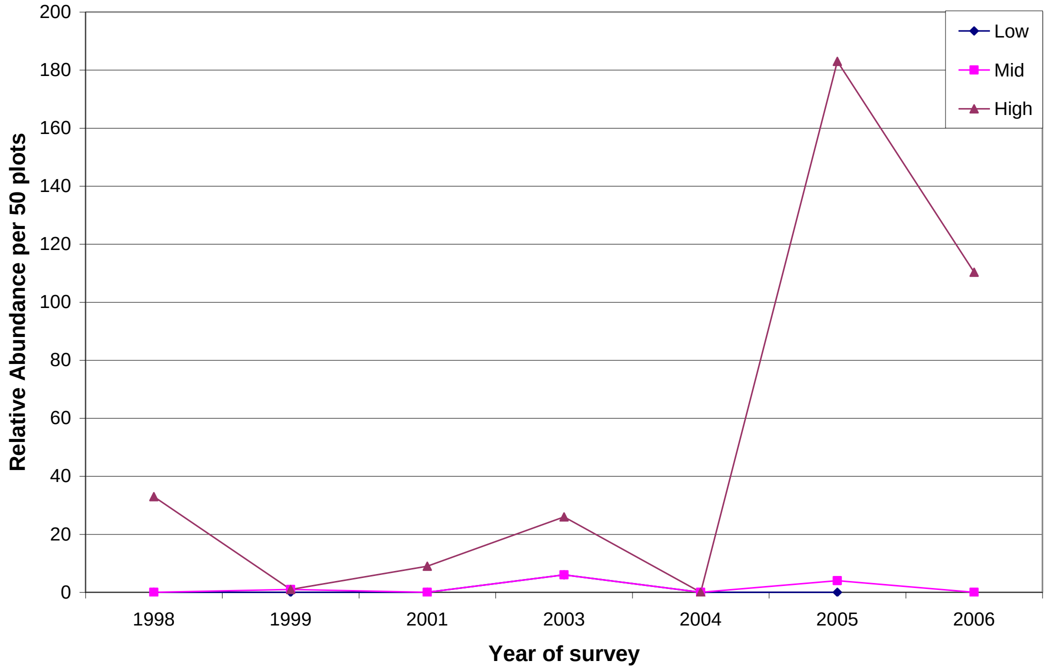
Figure 15 Kudu population at different altitudes



Reedbuck

Figure 16 below shows the activity of Reedbuck. Exceptionally high Relative Abundance (183 per 50 plots) was recorded in 2005, although this year's Relative Abundance at high altitude was much lower (110). Further work will reveal whether these changes are due to a discontinuous distribution rather than population changes.

Figure 16 Reedbuck population at different altitudes

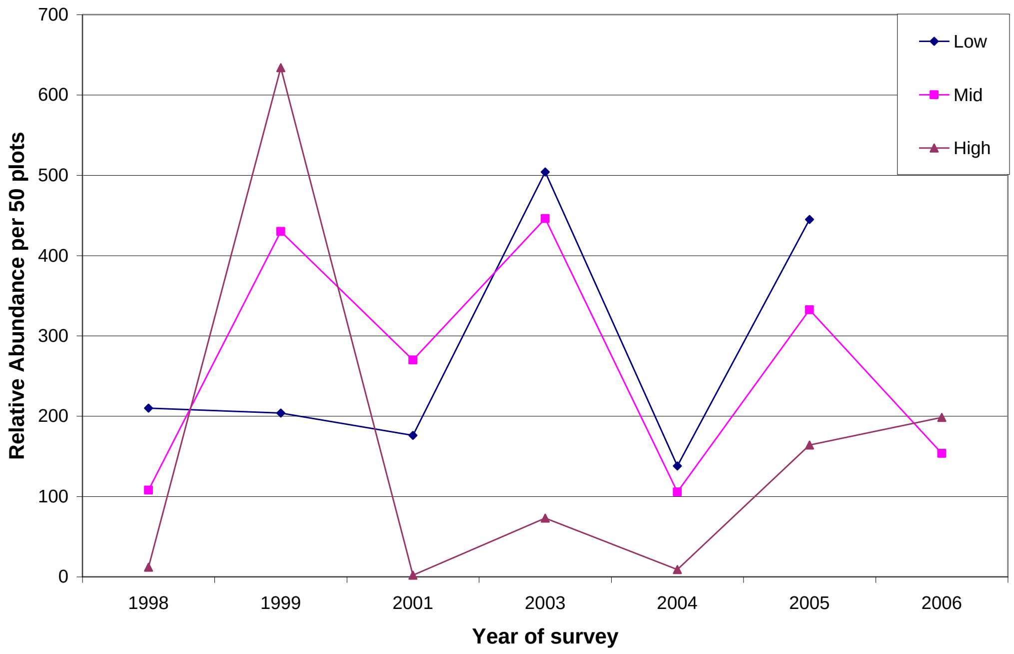


Reedbuck on burnt grassland *Marianne Overton*

Common Duiker

Figure 17 shows that there is no discernable trend in the population of Common Duiker. Unlike most other species the Common Duiker is present at all altitudes surveyed.

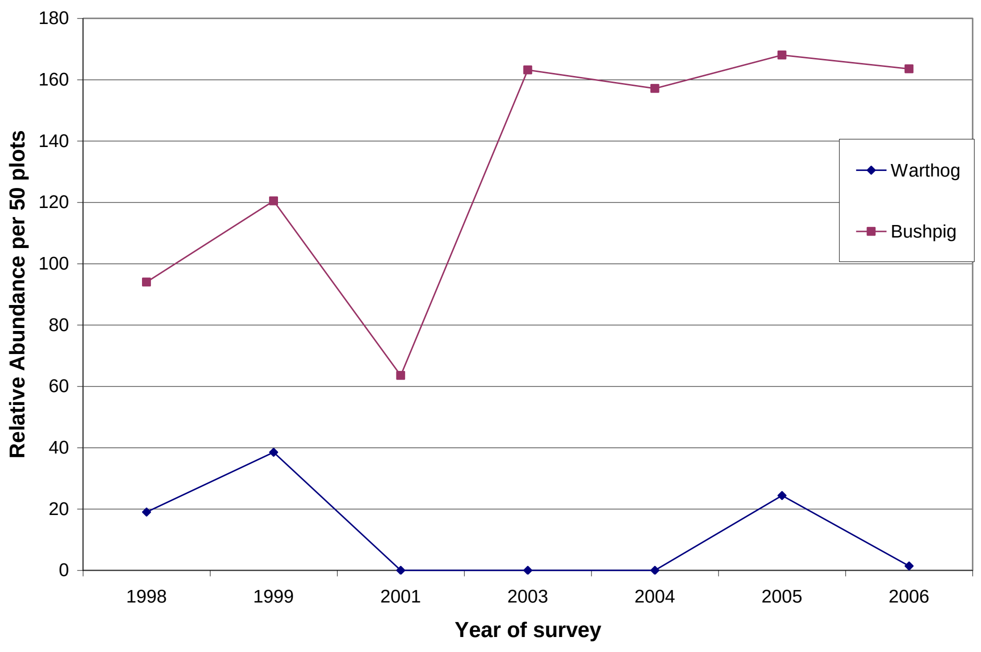
Figure 17 Common Duiker population at different altitudes



Pigs

There was considerable evidence of bush pigs in most of the areas we surveyed in 2006. The diggings and trails were ubiquitous, especially in the *Brachystegia* areas. Lewis Tumbuka suggested that progeny of domestic stock near Fingira, released or escaped from the village in 1978, are still about (and presumably may be interbreeding with the wild pigs). Warthog evidence remains restricted to the open grasslands on the plateau.

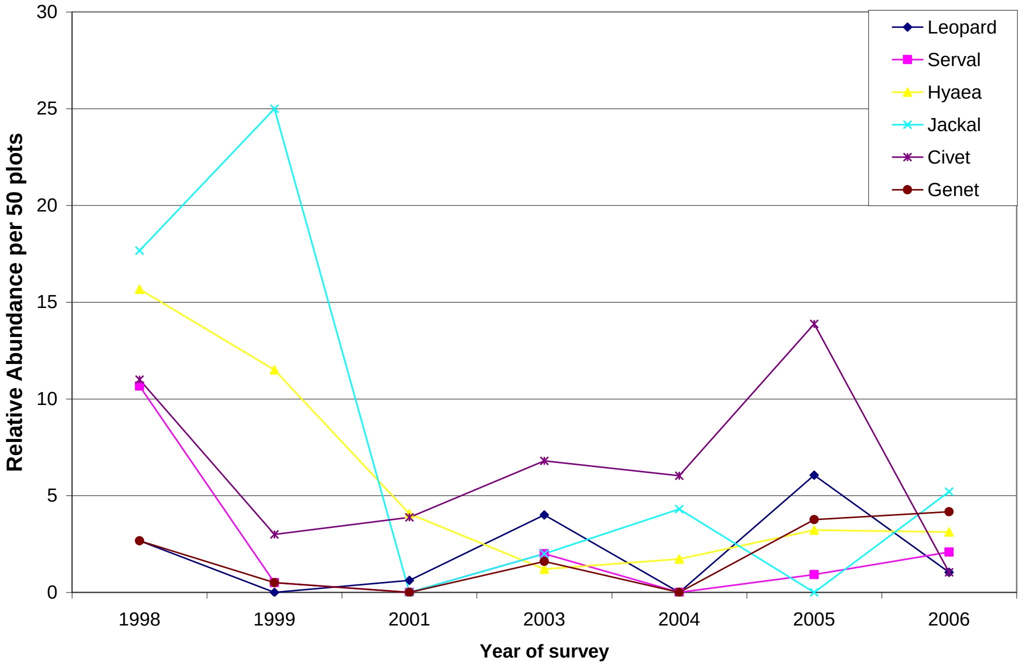
Figure 18 Population of pig species over the period 1998-2006



Carnivores

The populations of carnivores do not show such clear trends. Relative Abundances per 50 plots were unusually high in 1998, which for 3 of the 6 species were the highest recorded. Mongoose populations also do not show a clear trend through time (see fig. 7).

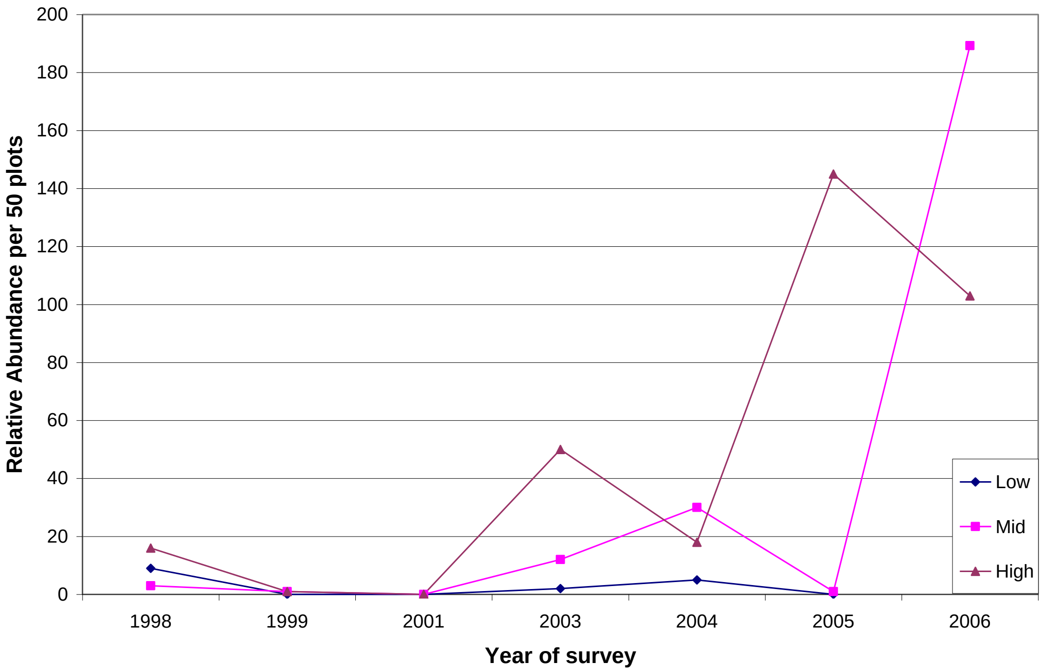
Figure 19 Population of carnivore species over the period 1998-2006



Porcupine

Porcupine is present at all the altitudes surveyed (see Figure 20), although most common at mid and high altitudes. Signs of activity are increasing.

Figure 20 Porcupine population at different altitudes



Other species

Red Forest Duiker

An important and elusive species with very few signs found, in evergreen forest patches on the plateau and in the riverine forest of the River Wovwe.

Grysbok

Grysbok was recorded in low numbers in 2004 and 2005, and no signs seen on either plots or transects in 2006.

Otter

Feeding signs of Otter were seen in a wooded section on the path alongside the River Wovwe.

CONCLUSIONS

Biosearch Nyika 2006 has shown that Eland, Roan Antelope, Bushbuck, Bushpig, Porcupine and Klipspringer are all faring relatively well, while Buffalo and Kudu are in a much more precarious position. In fact Buffalo and Kudu numbers appear to be so low that their persistence in the Park must at times be in doubt. Populations of species that can inhabit the plateau successfully have benefited from increased protection and it was heartening to see large populations in well-patrolled areas of the plateau. Continued monitoring of populations and patrolling is essential in the remoter regions of the park if some species are not to be lost altogether.

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Appendix 1 Large mammal field data above 6000ft (with small mammal data attached)

Square	Plot	Grid Ref	Jul	Alt ft	Location	Habitat	Burnt	Tree Canopy	Grass cover	Bush	Rock	Bare earth	Slope	Direction	Elephant	Eland	Roan Antelope	Reedbuck	Bushbuck	Common duiker	Red Forest Duiker	Bushpig	Zebra	Leopard	Serval	Hyaena	Jackal	Civet	Baboon	Porcupine	Aardvark	Mongoose	Scrub Hare	Genet	Honey Badger	Vervet monkey	Klipspringer	Rock hare	Cane rat	Mole rat	Mouse	Shrew	Tree squirrel
Plateau grassland >6000ft																																											
1	1	867102	10	6950	Fingira	Protea gra	0	25	100	25	25	0	0	0		3	3		3	7					1	3				3		1			3					3	3		
1	2	867104	10	6940	Fingira	Protea gra	0	10	90	45	0	0	10	0		3	1	1	3	3		3								4		3	7						2		7		
1	3	864102	10	6851	Fingira	Scrub	0	30	60	80	0	0	0	0		5	3		7	5													1						1		4	1	
2	1	869068	11	6455	Fingira	Protea gra	0	2	95	10	0	5	0	0		2			1	5		3								4		2	13								9	2	
2	2	865062	11	6411	Fingira	Protea gra	0	10	90	25	0	5	0	0		4			7	4		4																		3	4	1	
2	3	865061	11	6411	Fingira	Protea gra	0	10	90	25	0	5	0	0					12	5		3										1		1							3	1	
2	4	862067	11	6283	Fingira	Protea gra	0	5	90	10	0	0	0	0		3			13	2		4			1							3									3	1	
3	1	880079	12	6548	Fingira	Protea gra	0	5	95	20	0	0	0	0					14	4		3								1				1	1				7	3	7	8	
3	2	885075	12	6500	Fingira	Protea gra	0	10	90	30	0	0	0	0		3	2		8	3		3								3		4			1				4	3	3		
3	3	881072	12	6173	Fingira	Protea gra	0	0	90	10	5	5	0	0			2		3	4		3		1																	3	3	
3	4	880074	12	6307	Fingira	Protea gra	0	0	100	0	0	0	0	0					3	3		3								3		1			1						6	4	
5	1	957088	18	6950	Juniper	Protea gra	0	0	100	20	0	5	0	0		3	1		3	4		3								3										2	23	5	
5	3	956080	18	6800	Juniper	Protea gra	0	5	100	20	5	10	0	0		3			5	4		4																		1	3		
5	4	952087	18	7200	Juniper	Grasslanc	0	0	85	15	0	0	0	0		3	1		4	4		5								3	3										10	4	
6	1	802369	20	6980	Zungwara	Burnt gras	100	0	50	0	0	50	5	W		4	8	4	1	2		2	4							3											3		
6	2	803367	20	7060	Zungwara	Burnt gras	100	0	50	0	0	50	0	0		3	4	5		4		3	9							1			3		3					3	3	3	
6	3	801366	20	7012	Zungwara	Burnt gras	100	0	55	10	0	45	15	SE		9	5	3	2	3		7	3							1			5							1	3		
6	4	806367	20	6989	Zungwara	Grasslanc	0	0	50	0	0	50	10	N		11	12	8	1	5																					4		
6	5	806368	20	6700	Zungwara	Grasslanc	0	0	100	5	5	0	15	N		6	5	2	1	1		3	1							3			2							1	5		1
7	1	792312	21	7085	Zungwara	Grasslanc	0	0	95	5	0	5	10	W		5	2	4	3	5		5	1					1		3		3	3								4	3	
7	2	792319	21	7141	Zungwara	Burnt gras	100	0	50	0	0	50	20	E	2	4	11	23	2				7				3			6		1	2								9	3	
7	3	797318	21	7136	Zungwara	Grasslanc	20	0	50	60	25	0	0	0		3	12	2	2	2		6	2							4		3	5				4			3	3	4	
7	4	797317	21	7168	Zungwara	Grasslanc	0	0	80	80	20	0	0	0	5	23	8	5	4	1		10	2				1			7		3		1			2	9		3	5		
7	5	796315	21	7096	Zungwara	Open gras	5	0	95	5	5	0	0	0	1	5	1	4	3	3		4	3							3		3		1				9		3	3	1	
8	1	788367	22	6747	Zungwara	Open gras	0	0	95	5	5	0	15	S		3	3		3	3		3								1		3					2	1		2	3		
8	2	789360	22	6778	Zungwara	Open gras	0	0	45	5	0	60	15	E		3	18	11	3	5			3							3		1	2		1					3	5	2	
8	3	786364	22	6993	Zungwara	Open gras	15	0	40	0	5	40	0	0		10	3		3	6		3										1	1							1	4		
8	4	785365	22	7004	Zungwara	Rocky gra	0	0	90	0	15	5	0	0		3	5	3	3	3		3										1					4	1		1	3	2	
8	5	785369	22	6842	Zungwara	Open gras	0	0	70	25	40	0	0	0		3	4		3	1		3	3									1					21	11			9	1	
Relative abundance scores per 50 plots (n=29) Plateau grassland >6000ft															14	219	197	129	207	174	0	160	66	2	3	5	7	2	0	102	5	60	76	7	17	0	57	53	24	62	266	84	2
Grassland transect total RA (No. of transect 'plots' n=126)															1	76	221	41	14	15	0	7	50	10	5	3	6	0	8	40	1	0	21	3	1	0	4	1	0	0	0	0	0
RA per 50 plots for transect data																30	88	16	6	6	0	3	20	4	2	1	2	0	3	16	0	0	8	1	0	0	2	0	0	0	0	0	0
Woodland plateau >6000ft																																											
4	1	838069	13	6380	Fingira	Open woo	0	65	70	10	0	30	0	0					3	10		3							3	3	1	3				1					3		3
4	2	837068	13	6257	Fingira	Open woo	0	65	70	10	0	30	0	0					3	3		3							3		3	2									3		
4	3	834068	13	6150	Fingira	Open woo	0	60	80	15	0	20	30	SE					3	11		4							3		3	3				3				3	3	1	
4	4	832068	13	6375	Fingira	Open woo	0	60	60	15	0	40	0	0					3	3		3							3														
5	2	958080	18	7000	Juniper	Open woo	0	65	85	0	5	10	0	0					3	10		4							4	8					3						7	4	
RA per 50 ALL plateau plots (n=34)															12	187	168	110	199	203	0	162	56	1	3	4	6	1	24	103	15	63	65	6	19	6	49	46	21	57	250	79	6
RA per 50 wooded plots																0	0	0	150	370	0	170	0	0	0	0	0	0	160	110	70	80	0	0	30	40	0	0	0	30	160	50	30
Wooded transect total RA																0	0	0	0	1	0	3	0	1	0	0	2	0	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0
No 'plots' surveyed=25															25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RA per 50 wooded transect plots															0	0	0	0	0	2	0	6	0	2	0	0	4	0	0	10	0	0	0	0	4	0	0	0	0	0	0	0	0
Peat transect RA															0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All plateau transect 'plots' (n=151.8)															0	25	73	14	7	5	0	3	16	4	2	1	3	0	3	15	0	0	7	1	1	0	1	0	0	0	0	0	0

Appendix 2 Large mammal field data below 6000ft (with small mammal data attached)

Square	Plot	Grid Ref	Jul	Altitude Habitat	Burnt	Tree Canopy	Grass cover	Bush	Rock	Bare earth	Slope	Direction	Elephant	Eland	Roan Antelope	Reedbuck	Bushbuck	Common duiker	Red Forest Duiker	Bushpig	Zebra	Leopard	Serval	Hyaena	Jackal	Civet	Baboon	Porcupine	Aardvark	Mongoose	Scrub Hare	Genet	Honey Badger	Vervet monkey	Klipspringer	Rock hare	Cane rat	Mole rat	Mouse	Shrew	Tree squirrel	No.large mammal sp.	Total RA
Woodland slopes <6000ft (Wovwe)																																											
9	1	134437	26	4350	0	30	90	10	0	0	35	N					3	4		3							4	4					3					3	3			6	21
9	2	132439	26	4250	0	30	90	10	0	0	30	N					4	4		3							4	3		2								3	4			6	20
9	3	135434	26	4350	0	30	65	5	0	35	10	0					3	3		4							3	3		2									4			6	18
9	4	135433	26	4250	0	30	65	5	0	35	45	E					3	3		3							4	1		1								1	3			6	15
9	5	138432	26	4450	0	20	80	10	5	10	45	NW					2	2	1	3							3	3	1	2							3	3	3			8	17
10	1	131453	27	5081	0	5	100	15	0	0	45	S					3	3	1	3							4	4		1								1	3			7	19
10	2	138454	27	4568	0	40	90	30	0	5	30	W					4			6							3	3		3			3				4	3	3			6	22
10	3	138454	27	4650	0	40	10	5	20	80	40	W					3	3	1	3							11	4	3	5			1				2	3	9			9	34
10	4	138451	27	4550	0	40	10	5	20	80	40	W					3	5		3							7	6		7							3	3	3			6	31
11	1	140440	28	4100	0	35	90	5	5	10	30	SW					3	3		3							3	3											3			6	16
11	2	141443	28	4350	0	60	90	5	10	5	10	W					4	3		6							3	6									7	3	3			6	25
11	3	141446	28	4500	0	60	90	5	5	5	10	W	1				3	3	1	4							5	6									1	2	3			7	23
11	4	147445	28	4600	0	65	90	5	5	5	40	S					4	3		3							3	3	1	1							3	3	3			7	18
11	5	147445	28	4550	0	55	80	10	5	15	0	0					3	4		3							3	4	0	1								2	3			6	18
Relative abundance scores per 50 plots (n=14) woodland <6000ft													4	0	0	0	161	154	14	179	0	0	0	0	4	0	214	189	18	89	0	0	25	0	11	0	82	107	179	0	0		
Relative abundance scores per 50 plots (n=19) woodland													68	0	0	0	586	1206	11	656	0	0	0	0	25	0	628	536	217	297	0	0	124	116	11	0	61	166	595	145	87		
Total abundance													9	127	114	75	180	181	4	160	38	1	2	3	5	1	76	123	15	68	44	4	20	4	36	31	37	69	220	54	4		
Total RA per 50 plots													9	132	119	78	188	189	4	167	40	1	2	3	5	1	79	128	16	71	46	4	21	4	38	32	39	72	229	56	4		
STDEV all plots													0.79	4.06	3.99	3.92	2.81	2.21	0.28	1.78	1.86	0.14	0.20	0.43	0.47	0.14	2.32	2.12	0.85	1.57	2.35	0.28	0.94	0.45	3.14	2.37	1.72	1.35	3.44	1.77	0.45		
SE (n=48) per 50 plots													5.70	29.3	28.8	28.3	20.3	16.0	2.02	12.8	13.4	1.04	1.46	3.12	3.41	1.04	16.8	15.3	6.16	11.3	17.0	2.02	6.79	3.27	22.6	17.1	12.4	9.75	24.9	12.8	3.27		
STDEV high alt													0.92	4.39	4.40	4.52	3.31	2.49	0.00	2.00	2.13	0.17	0.24	0.51	0.54	0.17	1.16	2.17	0.87	1.33	2.71	0.33	0.89	0.54	3.69	2.79	1.40	1.33	3.91	1.92	0.54		
SE (n=34) per 50 plots													7.92	37.7	37.7	38.7	28.4	21.3	0.00	17.2	18.3	1.47	2.05	4.41	4.61	1.47	9.95	18.6	7.47	11.4	23.3	2.80	7.62	4.61	31.6	23.9	12.0	11.4	33.5	16.5	4.61		
STDEV mid alt													0.27	0.00	0.00	0.00	0.58	1.14	0.47	1.09	0.00	0.00	0.00	0.00	0.27	0.00	2.23	1.42	0.84	2.04	0.00	0.00	1.09	0.00	0.80	0.00	2.13	1.17	1.60	0.00	0.00		
SE (n=14) per 50 plots													3.57	0.00	0.00	0.00	7.74	15.2	6.26	14.6	0.00	0.00	0.00	0.00	3.57	0.00	29.8	19.0	11.3	27.3	0.00	0.00	14.6	0.00	10.7	0.00	2.13	15.6	21.4	0.00	0.00		

Notes for Appendices 1 and 2

Sq Random kilometer square, P plot 100m x 100m

Appendix 3 Large mammal relative abundance scores for July/August expeditions 1998-2006

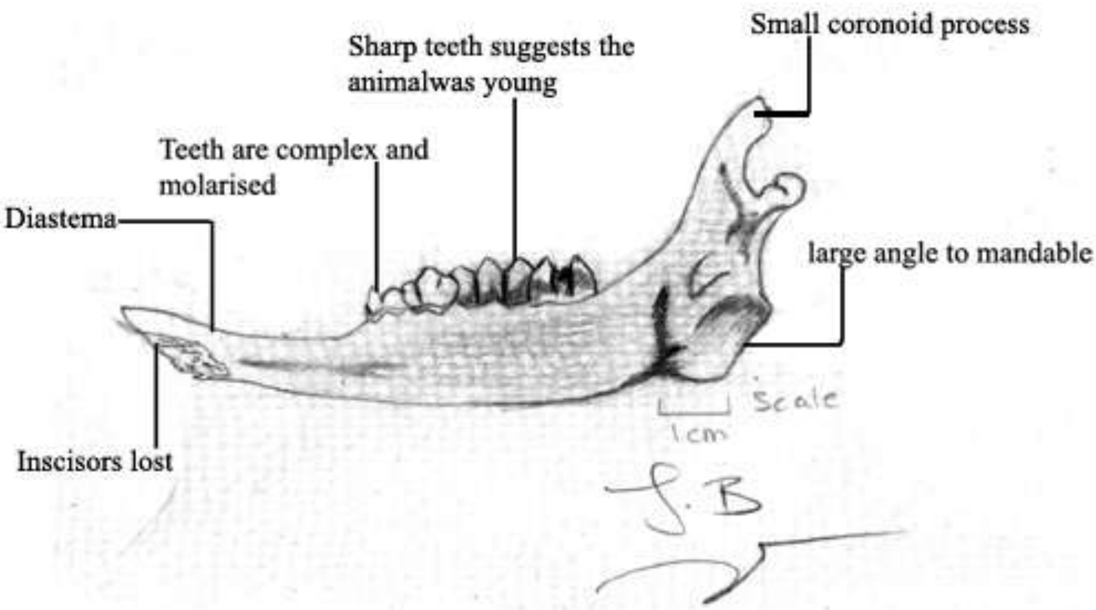
	Elephant	Eland	Roan Antelope	Kudu	Reedbuck	Bushbuck	Common Duiker	Grysbok	Red Forest Duiker	Buffalo	Warthog	Bushpig	Zebra	Leopard	Serval	Hyaena	Jackal	Civet	Baboon	Porcupine	Otter	Aardvark	Mongoose	Hare	Genet	Honey Badger	Vervet Monkey	Klipspringer	Total no. of species
Lowland																													
1998 Sawi	63	4	3	66	0	59	210	23	0	39	0	164	0	0	14	25	20	23	71	9	0	46	88	0	0	0	0	0	17
1999 Sawi (50 plots)	14	7	26	5	0	18	204	0	0	3	12	84	0	0	0	2	12	2	88	0	0	13	105	4	0	0	0	0	15
2001 Sawi (25 plots) 4-4,500ft	6	30	28	0	0	0	176	0	0	0	0	68	0	0	0	0	0	10	166	0	0	16	46	0	0	0	0	0	9
2003 Sawi (25 plots)	2	20	4	46	6	164	504	22	0	20		168	2	2	6	2	0	0	324	2	6	26	176	38	0	10	0	0	21
2004 Mpanda (10.5plots) 3-4000ft	0	0	0	0	0	29	138	10	0	0	0	24	0	10	0	5	0	0	167	5	0	0	38	33	0	0	0	0	10
2005 Chisanga (10 plots) 4-5000ft	0	0	0	0	0	114	445	0	0	0	0	160	0	0	0	0	0	10	215	0	0	10	175	0	25	0	5	0	8
Slopes 4-6000ft																													
1998 Chipome (50 plots)	78	51	87	17	0	36	108	3	0	43	10	79	0	6	16	8	24	8	2	3	11	16	38	32	7	0	0	0	22
1999 Chipome (25 plots)	83	144	24	70	1	84	430	0	2	72	59	115	0	0	1	20	32	3	39	1	4	19	95	49	1	0	0	0	22
2001 Chipome (30 plots)	82	8	40	13	0	17	270	20	0	23	0	57	2	0	0	10	0	2	53	0	0	3	20	67	0	0	0	0	16
2003 Chipome (50 plots)	37	24	30	52	6	68	446	81	0	25	0	206	0	2	2	2	0	13	90	12	3	5	107	82	4	0	0	0	22
2004 Mpanda (43.5plots)	3	9	8	24	0	47	106	2	0	5	0	134	0	0	0	2	5	7	159	30	0	6	40	5	0	0	0	0	17
2005 Chisanga (34 plots)	0	0	1	0	4	137	332	0	0	0	0	163	0	1	0	0	0	24	237	1	0	9	107	29	1	10	1	4	16
2006 4 sites (14 plots)	4	0	0	0	0	161	154	0	14.3	0	0	178.6	0	0	0	0	4	0	214	189	0	17.9	89.3	0	0	25	0	11	11
Plateau 6-7,500ft																													
1998 Chipome	14	78	38	0	33	20	12	0	3	0	47	39	2	2	2	14	9	2	0	16	6	46	14	15	1	0	0	0	21
1999 Chipome	97	158	24	75	1	102	634	0	2	75	71	199	0	0	1	22	44	5	127	1	4	32	200	53	1	0	0	0	22
2001 Chipome (25 plots)	10	9	2	0	9	1	2	1	1	0	0	67	0	2	0	1	0	0	0	0	0	51	4	1	0	0	0	0	14
2003 Chipome (50plots)	29	40	0	0	26	59	73	10	0	0	0	118	0	7	0	0	5	4	0	50	1	84	27	30	0	0	0	0	15
2004 Mpanda (17plots)	0	0	27	14	0	150	9	0	0	0	0	122.7	0	0	0	0	0	0	77	18	0	5	27	0	0	5	0	0	10
2005 Chisanga (29 plots)	162	212	202	0	183	86	164	0	0	0	53	174	79	12	2	7	0	2	33	145	0	9	117	52	7	9	5	55	22
2006 4 sites (34 plots)	11.8	187	168	0	110	199	203	0	0	0	0	162	56	1	3	4	6	1	19.1	103	0	14.7	63.2	64.7	6	19	6	49	22

BONE ANALYSIS

Jenna Birchall

COMMON DUIKER

Figure 1 Lateral view of a partial lower jaw from a herbivore (inner surface)

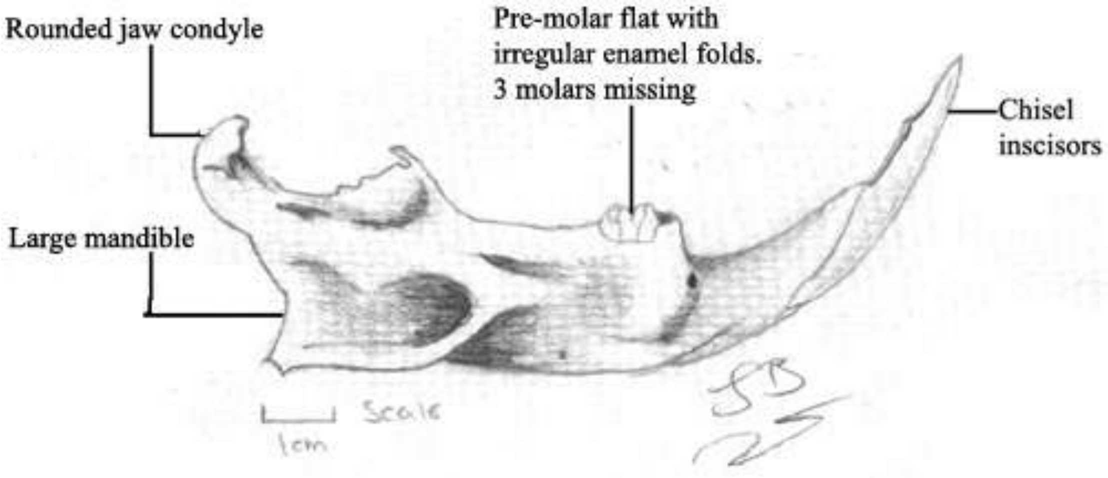


The features show that this lower jaw belonged to an herbivore. These include the large angle to the mandible for the attachment of a large masseter muscle, which allows the jaw to move from side to side and creates the forces necessary to process plant material. They also have a small coronoid process, where the temporalis muscle attaches. This muscle is more important for carnivores. The moralized teeth indicate that this animal was a ruminant artiodactyl; an even toed hoofed mammal (Pough et al, 2005; Wikipedia, 2007). Thus, its small size makes it likely that this lower jaw belonged an animal such as the Common Duiker.

Common Duiker
Order: Artiodactyla
Family: Bovidae
Genus: *Sylvicapra*
Species: *S. grimnia*
(Wikipedia, 2007)
Source: Huffman (2004)

PORCUPINE

Figure 2 Lateral view of a rodents lower jaw



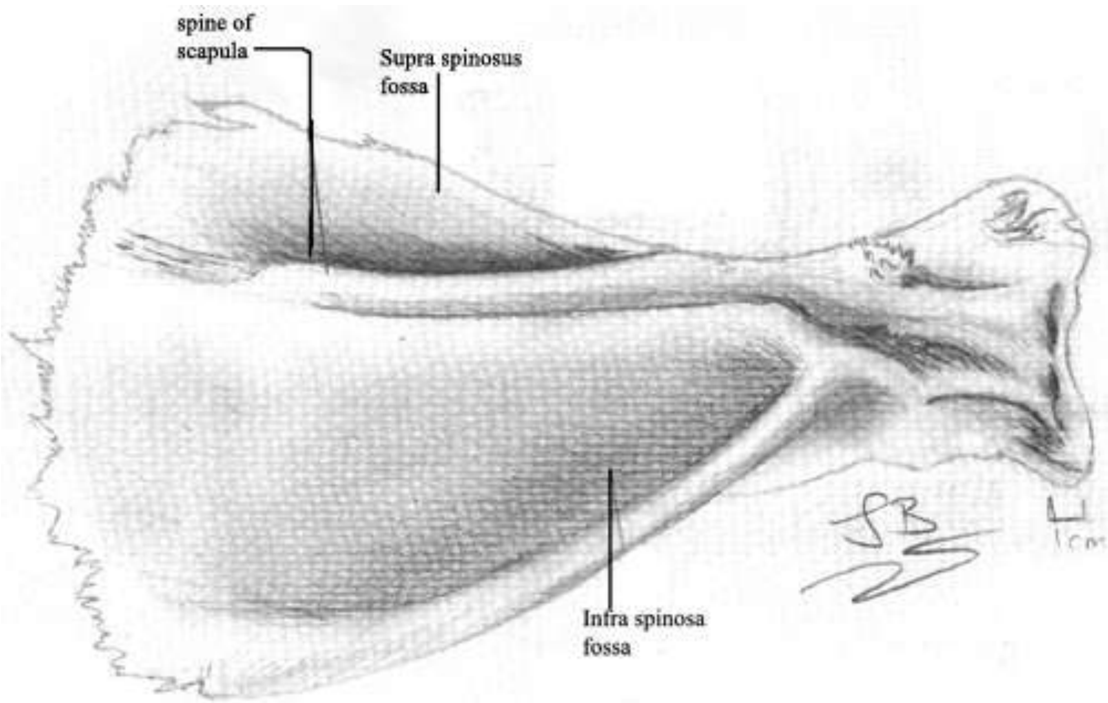
The features show typical rodent features. Firstly the incisors are chisel shaped, and ever-growing; a characteristic shared among all rodents. Although only one pre-molar was present, the flat shape with irregular folding of the enamel is further indication. The jaw condyle was rounded, which allows the jaw to move forward and back. The large mandible provides a larger surface area for the attachment of a larger masseter muscle. The size of the lower jaw indicates that the rodent was relatively large, and therefore most likely a porcupine jaw (Pough et al, 2005).

Porcupine
Order: Rodentia
Family: Hystricidae
(Wikipedia 2007)

Source of picture: Freshno Chaffee zoo (2007)

ELAND AND ROAN ANTELOPE

Figure 3 Lateral view of right scapula

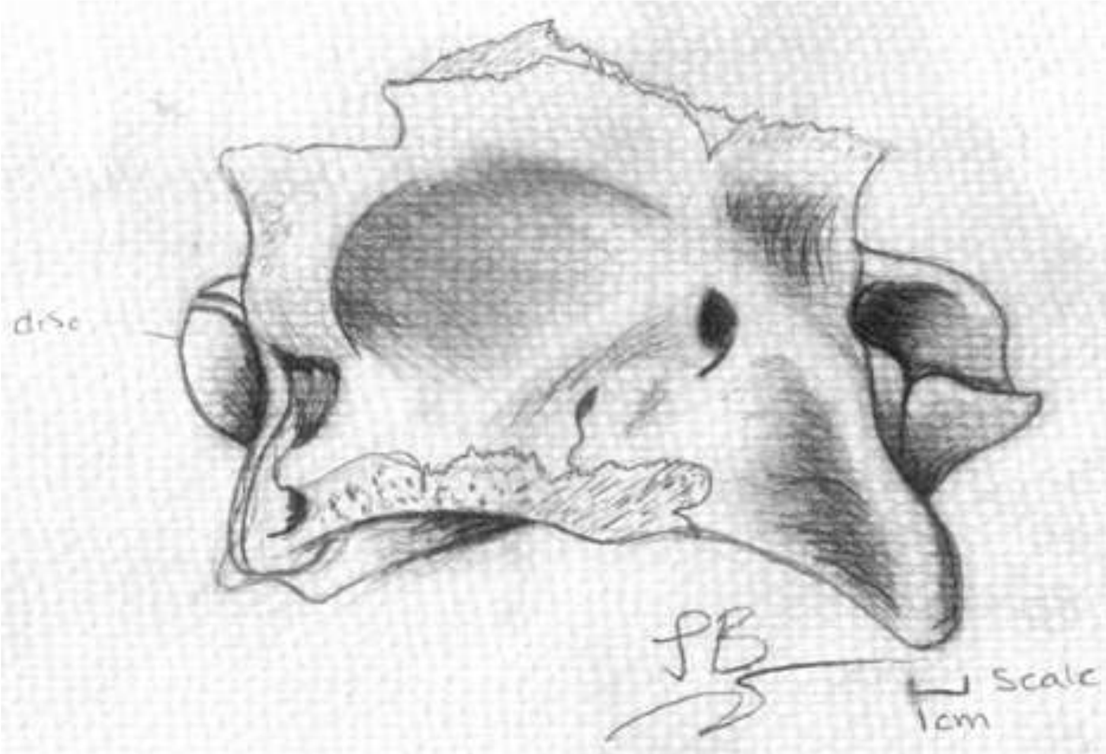


The figure above is that of a scapula from a large mammal. Its large size indicates that it belonged to a large mammal such as an Eland or Roan antelope.

Oder: Artiodactyla
Family: Bovidae
Genus: *Taurotragus*
Species: T. *oryx*
Eland
Source of images: Biosearch Nyika (2006)

Order: Artiodactyla
Family: Bovidae
Genus: *Hippotragus*
Species: H. *equinus*
Roan Antelope

Figure 4 Lateral view of a vertebrae



The figure above shows a vertebrae of a mammal. It was large, so is most likely that of an Eland or possibly Roan antelope.

POACHING REPORT

Richard Collins (All photos R. Collins)

The problem of poaching has been a plague on the Nyika National Park for many years. However, it is not an affliction that solely affects the beautiful animals that inhabit the area; the consequences of poaching are far reaching in Malawi. The natural resources of the Nyika are being put at risk by the ravaging bush fires set by intruders. Perhaps the most serious consequences are on a much wider scale; Malawi is reliant on encouraging its tourism industry in order to bolster its economy. If the Nyika had more visible game, tourism might benefit the people of Malawi more widely. In the following report we have recorded all the evidence of poaching and its effects, found during a period of 26 days research on the expedition in the Park.

PROBLEM OF POACHING

It was suggested that as many as 500 animals may have been poached in 2005 from the Nyika National Park, including large mammals, such as Eland and Roan Antelope. The beneficial effects of scout patrols in the area are now starting to become apparent with more large mammals in evidence. However, the patrols are still mainly on the plateau. There are still large areas of unpatrolled territory. One side effect is that some animals, such as elephants, stay up on the plateau even when food and other conditions appear to be better at lower altitudes. This could have a negative influence on their breeding.

Many poachers have grown up in these areas and know the landscape well. The park is a massive 3134-km^2 area and there is limited staff available to patrol. The poachers are often cunning and when seeing scouts enter an area they will wait a few days before entering. The proceeds from one Eland could be 10,000-15,000 Malawi Kwacha; perhaps three times a typical monthly wage.

POACHING TACTICS

The primary objective of poachers in the Nyika is to kill game for its meat. It is then sold to a small group of people; maybe getting 10-15 kg each at about 200MKw per kilogramme (a similar price to beef). This reduces the chance of being informed upon and there are therefore regular customers that are relied on. The meat can be dried in the park, or the animal simply gutted, then carried out of the park as quickly as possible, usually under the cover of darkness. A male eland can take up to eight people to carry whole, a bushbuck between two and three. Poachers often have porters to help with the hauling and to look out for scouts.

Poachers have to get to a close range before firing because of the low quality of their weapons. There have even been reports of sulphur being collected from matches to use as gunpowder. Homemade shotguns are the typical guns used and spent cartridges have been found. Poachers can creep up on animals whilst grazing or use the cover from bush thickets. Poaching is most serious when the maize crop runs out and food supply is low, this is around January, February and March. However, poachers are opportunistic; when there was a fuel shortage the scouts could not patrol and it there was thought to be an increase in poaching activity.

OBSERVATIONS

The need to closely stalk the animals often requires a second party to go to high ground to act as a spotter; in particular to warn if a scout is approaching. The spotter will wait on the top of a hill or outcrops for long periods and fires are made, or perhaps in more conspicuous areas, food already cooked is brought up for sustenance. There can be competition between poachers and scouts for the best viewpoints, giving advantage in terms of spotting the opposition.

DRYING RACKS IN FORESTS

The dead weight of an eland is around 400kg but, after drying, it is closer to 200kg. As a rapid exit is required, especially through the better-patrolled areas, drying is usually favoured. Poachers will take their kills into the cover of forest patches and construct drying racks. These are made from wood and can range in size and complexity from a simple cross beam, capable of holding a buck, to a large platform that could hold half a ton. The meat is butchered and then placed on these frames and a fire lit below them. After drying out, the meat is cut into strips and can be hidden under many guises, for example as wood rolled up between sticks.

COUNTER ACTION TAKEN BY THE PARK AUTHORITIES

There have previously been problems arising because of differences in patrolling in the Nyika National Park and across the border in the Zambian part of the park. In Zambia poachers were shot at by scouts, this was because it is easier for poachers to find guns in Zambia and armed with AK47s, they posed a deadly threat. This however encouraged Zambians to cross the border to poach in Malawi. However, in recent years a number of initiatives have come into action. One of the most important aspects is the cooperation on a cross border level that allows for more coordinated patrolling. It has also been estimated that the current program of action has halved poaching levels.

There have been successful schemes that have helped control poaching outside the scope of patrols. Local villagers have been offered incentives to respect and work for the good of the park. There is a 5km zone within the boundary, where some resources can be collected with a permit; these include honey, mushrooms and even fish in carefully selected parts. There are also wildlife schemes established in schools to help educate about the importance of the National Park.

If a poacher is caught and convicted the penalties are severe and the full sentence must always be completed. However problems inevitably arise in securing convictions. No weapons are allowed inside the park - including an axe, which carries a one year sentence. This means that a poacher cannot try to hide his crime under cover of collecting firewood. Some sentences are approximately as follows: fishing one and a half years, snares two and a half years, killing animals three to five years, 6000 MKw fine for poaching honey or up to two years in prison. Two people collecting ants got three years and women collecting orchids got a 300 MKw fine. Poachers may sometimes become informers and, if they provide information, money goes to their families. For a poacher facing time in jail, with no one to support his family, this can be an appealing option.

In all of Malawi's parks there are only around 300 scouts to do a huge amount of work. All scouts are trained in Liwonde National Park, to look for footprints and to live for prolonged periods in the bush. Some are trained in leadership. Scouts are dispatched to particular regions of the park and rotated after several years. There is competition between each region; whichever has the most convictions in terms of years per annum wins. Njalayankhunda came second last year with seven and a half years of convictions.

COUNTERACTION BY THE SCOUTS

A game scout will have 12 weeks training and a game ranger three years. The instruction is very rigorous and they go through a gruelling regime. This includes carrying a massive 40kg pack of stones over 25 miles of rough terrain and crossing from the extreme ends of the park on foot as fast as possible. In a month the scouts spend a minimum of 16-17 days out in the bush, going for five nights at a time. They buy their own food, with an allowance.

Poachers are ill equipped, with bows, spears and homemade guns. So when the scouts are issued with an automatic rifle, the poachers invariably run away. Scouts are not allowed to shoot poachers in the back but they can incapacitate them, for example if they refuse to throw down their weapon. Most poaching occurs on the plateau where there are more animals and this is consequently where most patrols are made.

On a typical scout patrol they will set up a base camp. From here they will go into the bush and search for any signs of poaching. If they spot several vultures in the sky, it is a good sign of a kill. They will go to high ground and also into dense forest, always alert for any signs of intrusion. There are also scouts ambushing the paths up to the plateau and they will radio up to the plateau that poachers have entered the park and in which direction they are headed. Anything found is recorded and submitted in a report.

The areas of patrol have to be considered carefully, ensuring a wide and effective patrol. Of course there are limited resources available and it is very difficult to continue running a consistent and valuable service when it is a struggle to pay basic wages. There are also problems of scouts being taken away from patrols for other duties andproblems with proper allocation of equipment such as binoculars.

ANECDOTES

On one ambush, two scouts spotted some poachers at 5 p.m. resting 500m from the edge of the park, waiting for nightfall. They waited until the poachers put on their rucksacks, then they couldn't run fast. One scout hid in the grass and stalked up behind one poacher, pushing him to the ground. When the second poacher tried to run the other scout was waiting for him, already blocking his path.

There was an incident of a poacher killing a Reedbuck and a Roan Antelope, then being chased across the bush. The poacher got stuck in marshy land, turned his gun on the scouts and they had no choice but to shoot him in the leg. They then cared for him all night, while he thought he would die and the following day carried him back on a makeshift stretcher. This was in very tough terrain, so steep that the man behind had to hold the stretcher above his head, the man in front by his ankles, just to try and keep it level.

A poacher once shot a bull elephant but only wounded it. It then charged after him in a fit of rage. The poacher ran and dived into an ant bear hole to get out of the way, where he was found cowering much later by scouts.

On a mammal plot through dense vegetation, there was an incident when Lewis, Michael and Marianne thought they heard something large ahead of them moving their way. It was Lewis's subsequent action that showed his professionalism. He ensured Michael and Marianne were in a safe position, readied his gun and prepared for the worst. Far from being trigger-happy he remained calm and composed until he could identify the danger. It was no more than one of our team! He later assured us that he would never fire unless he could clearly see the threat.

EVIDENCE DISCOVERED ON THIS EXPEDITION

<u>11.07.06</u>

Poaching Camp: 10º47.668 S 33º47.863 E
Map ref. 869068 Altitude 6455+/- 41ft

In a wood, two old fires, shelter and spent cartridge. From before the rainy season, nine or more months.

Possible Pitfall Trap:
10º47.763 S33º47.664 E
Map ref.870069 Altitude 6359+-71ft
Within 200m of the above, but it may have been excavation from previous inhabitants when Nyika was populated.

12.07.06

Observation Point: Map ref. 873092 Altitude 6950 ft

Remnants of fire on top of viewpoint; used to spot game or look out for patrols of scouts.

13.07.06

Poachers Fire: Map ref. 838071 Altitude 6000 ft

Under shelter of *Brachystegia* woodland near Fingira Rock.
Two poachers arrested on Thursday 13th July

14.07.06

Observation Point: Map ref. 874148 7231+/-26 ft

Maize cob remains (at least three), plastic wrapping. Peanut shells; sugar bag, from Malawi. Home made pellet and plastic wadding for use with mazariti – possible of killing an eland. Between 1 and 6 months old.

A poacher's fire

A homemade bullet

An empty sugar bag

Observation Point: Map ref. 878153 Altitude 7150+/-45 ft

Viewpoint offering excellent field of vision. Also had part of Malawian sugar bags.

Drying Rack, shelter and wood collected: Map ref. 874154 Altitude 6850+/-50 ft

Forest area of 300m^2, evidence of branches being cut down in several locations. This wood used in part to make a large drying rack, capable of holding animals as large as eland. The shelter suggests it is from the rainy season, probably February. Under the shelter was found a small plastic piece of boot from a repair. Bones thought to be eland were found in the vicinity and it is thought they were spread from rack by hyenas.

A small piece of boot from a repair

Fastening on a drying rack made from natural materials and extremely strong

A drying rack in an evergreen forest patch, large enough to hold an eland

Poaching Honey: Map ref. 873154 Altitude 6850+/-50 ft

Signs of smoking out bees and chopping out honeycomb. Over a year old.

<u>16.07.06</u>

Poachers Bridge: 10º45.293 S 33º49.958 E
Map ref. 911114 Altitude 5982 ft
Evidence of where poachers crossed the Chelinda river
Poaching Honey: Map ref. 922109 Altitude 6500+/-50 ft

Smoking out bees; signs only 3-4 weeks old.

17.07.06

Drying Rack: 10º45.074 S 33º54.328 E
Map ref. 994120
Altitude 7501+/-52 ft

In evergreen forest (home to blue monkeys), a poacher's drying rack and shelter. On edge of forest, allowing rapid exit to nearby woods. From approximately January-March period.

18.07.06

Poacher's Fire: Map ref. 958081 Altitude 7000+/-50 ft

Remains of fire in woodland, 2 years old.

Branch Cut:

A branch shaped as seen, left cut and hanging on tree. Perhaps for pulling down branches for firewood or pulling people up to get a view.

27.07.06

Chopped Wood: Map ref. 136454 Altitude 4600 ft

Branches cut, 2 months old. Trail to below mentioned cave.

Poacher's Cave: Map ref. 138454
Altitude 4675+/-50 ft

Regular poacher's site, firewood collected, grass collected, perhaps swallow eggs poached. Scouts have left message "PANU YAYI HEE!!" (Don't come here!)

Old Fire: Map ref. 138453 Altitude 4625+/-50 ft

Stones arranged as in surround of fire, over 1 year.

CONCLUSION

The task of patrolling the Nyika is daunting and the problem of poaching will always have to be safeguarded against. However, there is encouragement, perhaps we have turned a corner, for the first year of research there has been substantial evidence that patrols are having an effect in reducing poaching. Although the scouts are few in number, their training and equipment make them a potent force. Regular patrols combined with the National Source Committee's initiatives are making a difference. Yet undoubtedly this is dependent on steady funding. Ideally this could be provided by an increase in tourism, but it is a vicious circle and as such will only happen if poaching decreases.

LIST OF IDENTIFIED INSECTS FOUND IN NYIKA NATIONAL PARK AS AT 30TH JULY 2006

R.J.MURPHY F.R.E.S.

The arrangement of main families are in systematic order but sub families, genera and species are in alphabetical order for ease of reference.

ODONATA (DRAGONFLIES)

ZYGOPTERA (DAMSEL FLIES)

Agriidae

Phaon iridipennis (Burmeister 1839)

Chlorocyphidae

Chlorocypha consueta (Karsch 1899)
Platycypha caligata caligata (Selys 1853)

Chlorolestidae

Chlorolestes conspicua Selys

Coenagriidae

Aciagrion gracile (Sjostedt 1909)
Enallagma subfurcatum Selys 1876
Pseudagrion spernatum spernatum Selys 1881

Lestidae

Lestes pallidus Rambur 1842

Protoneuridae

Chlorocnemis marshalli marshalli Ris 1921
Chlorocnemis montana maccleeryi Pinhey 1969

Anisoptera (Open winged dragonflies)

Aeshnidae

Aeshna ellioti usambarica Forster 1906
Anax imperator mauricianus Rambur 1842
Anax separatus Hagen 1867
Hemianax ephipigger (Burmeister 1839)

Gomphidae

Notogomphus zernyi (St Quentin 1942)
Paragomphus cognatus (Rambur 1842)

Libellulidae

Atoconeura biordinata Karsch 1899
Crocothemis sanquinolenta (Burmeister 1839)
Orthetru caffrum caffrum (Burmeister 1839)
Orthetrum julia Kirby 1900
Orthetrum julia falsum Longfield 1955
Palpopleura jacunda Rambur [1842]
Palpoleura lucia (Drury 1773)
Pantala flavescens Fabricius 1798
Porpax risi Pinhey 1958
Tramea basilaris Palisot de Beauvios 1817
Trimethis annulata (Beauvois 1805)
Trimethis arteriorosa (Burmeister 1839)
Trimethis furva Karsh 1899
Trimethis werneri Ris 1912

BLATTODEA (COCKROACHES)

Derocalymna versicolor Burmeister
Pseudopeltis neavei Princes 1963

ISOPTERA (TERMITES)

Separate report by Dr Sarah Donovan

MANTODEA (PRAYING MANTISES)

Mantidae

Metentella mervensis Sj

DERMAPTERA (EARWIGS)

All specimens awaiting determination

ORTHOPTERA (GRASSHOPPERS)

Encifera (Crickets)

Tettigoniidae

Enaliopsis petersi Schaum
Ruspolia vicinus Walker
Zabalius orientalis Karsch

CAELIFERA (GRASSHOPPERS)

Acrididae

Acorypha laticosta (Karsch 1896)
Acrida acuminata Stal 1873
Acrophymus sqamipennis (Brancsik 1897)
Catantops axillaries (Thunberg 1815)
Coryphosima stenoptera (Schaum 1853)
Cyrtacanthacris septemfasciata (Serville 1838)
Gastromargus africanus (Saussure 1888)
Gymnobothrus linea-alba I Bolivar 1889
Heteropternis couloniana (Saussure 1884)
Orthochtha dasycnemis (Gerstaecker 1869)
Tmetonota abrupta (Walker 1870)

Lentulidae

Usambillia olivacea Sjostedt 1909

Pamphagidae

Lobosceliana gilgilensis I Bolivar 1915

Pyrgomorphidae

Maura bolivari Kirby 1902

HEMIPTERA

Heteroptera (Stink bugs / Assassin bugs)

Belastomatidae

Lethocerus niloticus Stal

Coreidae

Anoplocnemis curvipes Fabricius
Anoplocnemis dallasiana L & S
Anoplocnemis montandorii Distant
Mirperus tongorma
Petascelis remipes Signoret

Lygaeidae

Lygaeus lemniscatus Stal
Spilostethus rivularis Germar

Pentatomidae

Agonoscelis pubescens Thunberg
Antestiopsis cincticollis Schaum
Atelocera attenuata Distant
Atelocera foveata Dallas
Dalsira atricostata Distant
Dismegistus royeri Jeanneli
Dysdercus fasciata Signoret
Encosternum delegorguei Scopoli
Natalicola delegorguei Spin
Nazara viridula Fabricius

Reduviidae

Coranopsis vittata Horvath
Ectomocoris cruciger Fabricius
Etrichodia crux (Thunberg)
Rhinocoris albopunctatus Stal
Rhinocoris erythrocnemis Germar
Rhinocoris neavei Bergoth 1912
Vitumnus scenicus Stal

Rhopalidae

Serinetha amicta Germar

Scutelleridae

Callidea drgii Germar
Deroplax silphoides Thunberg

Homoptera (Plant bugs)

Phymateus viridipes Stal 1873
Phyteumas purpurascens (Karsch 1869)

Separate report by Karim Vahed on a further 60? species.

PHASMATODEA (STICK INSECTS)

All specimens awaiting determination

Cicadidae

Loba leopardina Distant
Koma bombifrons Karsch
Monomatapa insignis Distant
Orapa nyassana
Ugada nutti Distant

Circopidae

Ptyelus flavescens Fabricius
Ptyelus grossus Fabricius
Locris jugalis Jacobi
Locris nata Walker

Coccidae

Gascardia brevicauda (Hall)
Saissetia oleae (Bernard)

Eubrybrachidae

Mesonitys fuelleborni
Paropioxys bellus Distant

Fulgoridae

Benamatapa marshalli Distant
Zanna clavaticeps (Karsch 1890)
Zanna pustulosa Gerstaecker
Zanna Tenebrosa Fabricius

Neuroptera (Ant Lions)

Acalaphidae

Tmaesibasis lacerata Hagen

Mantispidae

Mantispa tenella Erichson

Myrmeliontidae

Banyutus idoneus (Banks)
Banyutus lethalis Walker
Banyutus posterior Navas 1931
Centroclisis brachygaster (Rambur 1842)
Hagenomyia lethifer (Walker)
Palpares normalis
Palpares obsoletus Gerstaecker
Palpares sparsus McLachlan 1867

Psychopsidae

Silveria marshalli McLachlan

COLEOPTERA (BEETLES)

Adephaga (Predatory Beetles)

Carabidae

Callistomimus rufiventris Brett
Cypholoba graphipteroides Guerin
Cypholoba tenuicollis Horni
Eccoptoptera cupricollis Chandois
Galeritiola inversa Basileusky
Psecadius obertheuri Gestro
Scarites senegalensis Dejean
Sterestoma stuhlmanni Kolbe

Cicindelidae

Cylindera marshallisculpta (W Horn 1913)
Dromica gracillis W Horn 1909
Dromica mauchi marshalli Peringuey 1894
Psiloptera iridiventris Kerremans
Spenoptera longiusula
Sterapsis amplipennis Fahroeus
Sternocera orissa variabilis Kerremans 1886

Cantharidae

Lycus murrayi Bourgoin

Cerambycidae

Calanthemis cf conradti Kolbe
Ceroplesis hauser conjunctai Hintz
Ceroplesis thunbergi Fahroeus
Chromolizus leucorhaphis (Gerstaecker 1855)
Coptoeme krantzi (Distant 1898)
Deroplia simplex (Fairmaire)
Dirphya leucostigma (Harold)
Erioderus pallens
Eunidia piperita Gahan
Hecyra tenebrionides Fahroeus
Idactus strandi Breuning
Laziopezus nigromaculatus (Quedenfeldt)
Macrotoma natala Thomson 1860
Mimophrisma livingstonei Sudre & Teocchi 2001
Monoxenus bicarinatus Aurivillius
Noserius aenescens Aurivillius
Oligosmerus limbalis Harold
Phyllocnema mirifica (Parc)
Prosopocera luteomarmorata Breuning
Prosopocera marshalli Aurivillius
Prosopocera schultzei Kratz
Stromatium barbatum Fabricius
Tragocephala ducalis White
Tragocephala frenata Gerst
Tragocephala variegata Bertoloni 1849
Xystrocera skeletoides Breuning 1957

Chrysomelidae

Asbecesta duviviari Jacobi
Bradlema neavei Heinze
Cassida suspiciosa Weise
Chrysomela saegeri Burgeon 1941
Corynodes dejeani Bertoloni
Gastrida abdominalis Chap
Hypercantha deverani Weise
Rhopaloteres grandis interruptoabbreviatus (W Horn 1921)

Dytiscidae

Hydaticus flavolineatus Boheman

POLYPHAGA (LEAF EATING & OTHER BEETLES)

Anthribidae

Xylinada meculipes Fahroeus

Buprestidae

Acmeodera subprasina Mars
Alissoderus nodicollis
Hoplistura disjuncta Fabricius
Meliboeus carinatus
Psiloptera albomarginata Herbst
Psiloptera coleopteroides Sol
Idacantha conifera Fairmaire
Phaedoria areata Fabricius

Cleridae

Dieroplesis maculatus

Coccinelidae

Cheilomenes aurora (Gerstaecker 1781)
Cheilomenes lunata (Fabricius 1775)
Chnootriba similis (Thunberg 1781)
Declivitata olivieri (Gerstacker 1862)
Epilachna ardiosiaca (Sicard 1912)
Epilachna dregei Mulsant 1850
Henospilachna bifasciata (Fabricius 1781)
Henospilachna quadrioculata (Kolbe 1897)
Lioadalia intermedia Crotch 1874

Curculionidae

Lixus areicatus

Elateridae

Anisomerus lamellicornis Fairmaire
Calais antinorii Candeze
Calais lecordieri Girard
Propsephus apiculatus Boheman
Propsephus nigrifrons *Calais* Basilewsky
Propsephus cf castaneus Fleutiaux

Histeridae

Hister jeanelli Desbordes
Hister mechowi Schmidt
Kissister congoensis Burgeon
Tribalus floridus Vienna

Staphylinidae

Staphylinus subaenus Roth

Hispidae

Dactylispa pallipes (Kratz)

Hydrophilidae

Sphaeridium scarabaeoides Linnaeus

Lucanidae

Nigidius laticornis Boileau 1911

Meloidae

Coryna katonensis Pic
Coryna mylabroides Lap
Decatoma sobrina Peringuey
Mylabris amplectens Gerstaecker
Mylabris dicincta Berbl
Mylabris holocericea Klug
Mylabris occidentalis Harold
Mylabris tripartita Gerstaecker
Mylabris tristigma Gerstaecker
Synhoria cephalotes Ol

Melyridae

Apalochrus malachioides Fairmaire
Ebaeus confluens
Melyris atricornis Champ
Melyris nigripes Hav

Scarabaeidae

Aphodiinae
Aphodius bucolicus Bordat
Aphodius ciprianii Balthasar
Aphodius critchlowi Bordat
Aphodius gorillae Bordat
Aphodius humilis Roth
Aphodius kanemicus Endrodi
Aphodius kaszabi Endrodi
Aphodius koracsi
Aphodius lacunosus Schmidt
Aphodius leoninus Schmidt
Aphodius malawiensis Bordat
Aphodius noehaematiticus Landin
Aphodius nyika Bordat
Aphodius pauliani Endrodi
Aphodius pseudourostigma Balthasar
Aphodius punctiger Endrodi
Aphodius rothschildi Schmidt
Aphodius schoutedeni Boucomont
Aphodius strangularis Bordat
Aphodius teter s.l. Roth
Lorditomaeus horni (Balthasar)
Notocaulus machatshkei Endrodi
Notocaulus schoutedeni Boucomont

Cetoniinae
Ceratorrhina preissi Moser 1912
Chondrorrhina picturata Harold 1878
Coelorrhina loricata loricata Janson 1877
Cosmiophaenia rubescens Brancsik 1914
Daedycorrhina bidenticornis Allard 1985
Gnathocera cruda pilicollis Kolbe 1901
Gnathocera trivittata costata Ancey 1833

Heteropseudinca moseri Hauser 1904
Heteropseudinca wentzle heckmannae Kolbe 1901
Leucocellis adspersa (Fabricius 1801)
Leucocellis diversiventris Moser 1913
Leucocelis rufithorax
Melenesthes jocquei Allard 1968
Pachnoda upangwana Moser 1918
Pachnodoides murphyi Alexis & Delport 2002
Poecilophila maculatissima Boheman 1860
Stephanorrhina princeps Oberthur 1880
Tmesorrhina runsorica rubripes Allard 1991

Coprinae
Caccobius inconspicuous Fahraeus 1857
Caccobius ocellipennis D'Orbigny 1913
Catharsius mossambicanus Ferreira 1960
Catharsius satyrus Kolbe 1893
Copris amyntor Klug 1855
Copris dudleyi Cambefort
Copris insidiosus Peringuey 1900
Copris integer Reiche 1847
Copris mesacanthus Harold 1878
Diastellopalpus fuelleborni (Kolbe 1900)
Diestellopalpus thomsoni (Bates 1888)
Heliocopris hamifer Harold 1878
Heliocopris hermes Gillet
Onitis sulcipennis Felsche 1907
Onitis vanderkelleni Lansberge 1886
Onthophagus abruptus D'Orbigny 1913
Onthophagus albipodex D'Orbigny 1902
Onthophagus biconifor D'Orbigny 1905
Onthophagus cinctipennis Quedenfeldt 1884
Onthophagus clitellarius D'Orbigny 1908
Onthophagus cribripennis D'Orbigny 1902
Onthophagus crucenotatus D'Orbigny 1905
Onthophagus dinoderus D'Orbigny 1913
Onthophagus foraminosus D'Orbigny 1902
Onthophagus gradivus Balthasar 1966
Onthophagus granosus D'Orbigny 1913
Onthophagus insignis Peringuey 1896
Onthophagus laminidorsis D'Orbigny 1902
Onthophagus naevius D'Orbigny 1913
Onthophagus parumnotatus Fahraeus 1857
Onthophagus perniger Boucomont 1930
Onthophagus quadrimaculatus Raffray 1877
Onthophagus simulator D'Orbigny 1905
Onthophagus subhumeralis D'Orbigny 1902
Proagoderus biarmatus D'Orbigny 1908
Proagoderus brucei (Reiche 1847
Proagoderus chrysopes (Bates 1888)
Proagoderus Dudley Cambefort 1980

Dynastinae
Cyphonistes vallatus (Wiedeman 1823)
pycnoschema corpulenta Peringuey
Pycnoschema scrofa Harold
Temnorrhynchus coronatus (Fabricius 1781)Uledi 7

Rutelinae
Popillia bipunctata (Fabricius)
Popillia browni Kolbe

Scarabaeinae
Anachalcos procerus Gerstaecker 1874
Garreta azureus Janssens
Garreta malleolus (Kolbe 1895)

Tenebrionidae

Catamerus rugosus Gahan
Catamerus sulcatus Fabricius
Distretus variabilis Gib
Lagria villosa Fabricius

Trogidae

Trox caffer liliana Scholtz
Trox nyansanus Haaf

DIPTERA (FLIES)

Asilidae

Lamyra gulo Loew 1851
Laxenecera albicincta (Loew 1852)

Bombyliidae

Bombylius haemorrhoidalis Bezzi 1921
Exoprosopa magnipennis Bezzi 1924
Lithorhinia basalis Ricardo 1901

Eristalinae
Senapsis dibapha Walker 1849

Platystomatidae

Bromophila caffra Macqart 1846

Syrphidae

Senapsis dibapha Walker 1849

Tachnidae

Dejeania bombylans Fabricius 1798

MECOPTERA (HANGING FLIES)

Bittacus livingstoni Londt 1981
Bittacus montanus Weeler
Bittacus tuxeni Byers

TRICHOPTERA (CADDIS FLIES)

All species awaiting determination

LEPIDOPTERA (MOTHS & BUTTERFLIES)

HETEROCERA (MOTHS)

Arctiidae

Amerilia bubo (Walker 1855)
Argina Amanda (Boisduval 1847)
Cyana pretoriae (Distant 1897)
Diacrisia lutescens (Walker 1855)
Diacrisia testacea (Walker 1855)
Eyralpenus scioana (Oberthur 1880)
Galatra doriae (Oberthur 1879)
Macrosia chalybeata Hampson 1901
Nyctemera leuconoe leuconoe Hopffer 1858
Seriarctia metaxanthia Hampson 1909
Spilosoma lutescens Walker 1855
Spilosoma sulphurea Bartel 1903
Teracotona metaxantha (Hampson 1909)
Tumicla sagenaria (Wallengren 1860)

Cossidae

Azygophleps aburae Plotz
Azygophleps coffea Aurivillius
Eulophonotus myrmelion Felder 1874
Macrocossus toluminus (Druce 1887)

Ctenuchidae

Syntomis cereera Linnaeus

Epilemidae

Leucoplema triumbrata (Warren 1902)

Geometridae

Ennominae
Aphilopota interpellans (Butler 1875)
Argyrophora trofonia (Cramer [1779])
Argyrophora variabilis Kruger1999
Ascotis reciprocaria (Walker 1860)
Chiasmia johnstoni (Butler 1894)
Chiasmia procidata semispurcata (Walker [1863])
Chiasmia rectistriaria (Herrich-Schaffer 1854)
Chiasmia rhabdophora (Holland 1892)
Chiasmia streniata streniata (Guenee [1858])
Chiasmia trisolaria
Coenina dentataria Swinhoe 1904
Colocleora divisaria divisaria (Walker 1860)
Colocleora faceta (Prout LB 1934)
Coleocleora leucostephana Prout
Cophophlebia olivata Warren 1894
Drepanogynis glaucichorda Prout LB 1916
Epigynopteryx anopthalma
Epigynopteryx flavedinaria Guenee
Epigynopteryx maeviaria (Guenee 1857)
Erastria madecassaria (Warren 1897)
Iodes flexilinea Warren 1898
Isturgia exospilata (Walker 1861)
Micrologia lutetincta Prout LB 1916
Nopia flexilinea Warren
Oedicentra albipennis Warren 1902
Odontopera integraria Guenee
Pareclipsis anopthalma Prout LB 1916
Psilocera pulverosa (Warren 1894)
Pycnostega obscura Warren 1905
Semiothisa subcurvaria Mabille 1897
Sphingomima variosa Prout LB 1915
Xanthis tarsispina Warren
Xylopteryx arcuata (Walker 1862)
Xylopterix interposita Warren
Zamerada crysopa Fletcher 1975
Zamerada dentigera Warren 1909
Zamerada dorsiplaga Prout LB 1922
Zamerada euerces Prout LB 1928
Zamerada fessa Prout LB 1912
Zamerada glareosa Bastelberger 1909
Zamerada metroscaphes Prout LB 1912
Zamerada purimargo Prout LB 1912
Zamerada rubrifascia Pinhey 1962
Zamerada rufilineria Swinhoe 1904
Zamerada scintillans Bastelberger 1909

Geometrinae
Celedomphax anaplaga (Warren 1905)
Chlorosterrha semialba Swinhoe
Heterorachis simplicissima (Prout LB 1912)
Lophorrhachia rubricorpus (Warren 1898)
Mixocera xanthostephana Prout LB 1912

Omphacodes punctilineata (Warren 1897)
Paragathia albimarginata Warren 1902
Pingassa abyssinaria (Guenee [1858])
Pingassa murphyi Herbulot 1994
Prasinocyma nereis Townsend
Rhodophthitus roseovittatus Butler

Larentiinae
Asthenotricha dentatissima Warren 1899
Gonanticlea meridionata (Walker 1862)
Larentia bitrita (Felder & Rogenhoffer 1875)
Larentia sublesta Prout
Mimoclista annulifera Warren
Piercia bryophilaria (Warren 1903)
Piercia ciliata Janse 1933
Piercia impunctata Janse
Piercia pracinaria Warren 1901
Pseudolarentia megalaria (Guenee 1858)
Scotopteryx nictictaria (Herrich-Schaffer 1855)
Xanthorhoe exorista Prout LB 1922

Sterrhinae
Chlorerythra rubiplaga Warren 1895
Scopula latitans Prout LB 1920
Scopula opicata (Fabricius 1798)
Somatina sedata Prout LB 1922

Hepialidae

Antihepialus keniae Holland
Gorgopsis abbotti Holland
Gorgopsis caffra Walker 1856

Lasiocampidae

Bombycopsis indecora Walker 1865
Diapalpus congreganus Strand 1913
Dipluriella songeana Strand 1913
Epicnapteroides lobata Strand 1913
Eutrica seriofasciata Aurivillius 1921
Gonometa griseocincta Hampson 1910
Lebeda mustelinia Distant 1899
Nadiasa cuneata (Distant 1897)
Odontocheilopteryx myxa Wallengren 1860
Odontocheilopteryx pattersoni Tams 1926
Opisthodonta cymographa (Hampson 1910)
Pachymetana sanquicincta (Aurivillius 1901)
Philotherma rufescens Whichgraff 1921
Pseudolyra lineadentata (Bethune-Baker 1911)
Shausinna affinis Aurivillius 1910
Streblote craterum
Streblote fusca (Aurivillius 1905)
Streblote pachyla Tams
Streblote vesta Druce 1888

Limacodidae

Chrysopolominae
Chrysopoloma isabellina Aurivillius 1895

Ectropinae
Ectropa ancilis Wallengren 1863

Limacodinae
Afraltha chionostola (Hampson 1910)
Afrobirthama reducta Herring M. 1928
Coenobasis albiramosa (Walker 1865)
Crothema gloriosa Hering
Ctenolita melanosticta (Bethune-Baker 1909)
Lembopteris neglecta Hering
Omocena dollmani Westwood
Pantoctenia gemmans Felder 1874
Panoctenia prasina (Butler 1896)
Parasa lanceolata Hering
Parasa latisriga Walker
Parasa Tamara Hering
Parasa vivida (Walker 1865)
Stroter dukei Janse 1964
Susicina pyrocausta Hampson 1910

Lymantriidae

Agyrostagma niobe Weymer
Aroa discalis Walker 1855
Cimola opalina Walker 1855
Cropera stilpnarona Herring 1926
Eudasychira goodi Holland

Hyaloperina erythroma Coll
Laelia basalis (Walker 1855)
Laelia bifascia Hampson 1905
Laelia cuvivirgata (Karsch 1895)
Laelia fracta Shaus & Clements 1893
Leucoperina impuncta Butler
Narona varipes (Walker 1865)
Psalis pennatula (Fabricius 1793)
Pteredoa monosticta (Butler 1898)
Rhypopteryx rhodalipha (Felder 1874)
Rhypopteryx rubripunctata Weymer 1892
Stilpnaroma venosa Hering

Noctuidae

Transferred Arctiids
Asota speciosa (Drury 1773)

Acontiinae
Amyna punctum (Fabricius 1794)
Eublemma baccalix (Swinhoe 1886)
Ozarba heliastis (Hampson 1902)
Ozarba megaplaga Hampson

Agaristinae
Agoma trimeni (Felder 1874)
Brephos nigrobasalis (Bartel 1903)
Brephos nyassana Bartel 1903

Crameria amabilis (Drury 1773)
Ovios capensis (Herich-Schaffer [1854])
Pseudopais nigrobasalis Bartel 1903
Tuerta rema Druce

Amphypyrinae
Busseola fusca (Fuller 1901)
Callopistra maillardi (Guenee 1862)
Callopistra yerburii Butler 1884
Conservula alambica Gaede 1915
Conservula minor Holland 1896
Mazuca roseistriga Fletcher
Phalerodes cauta (Hampson 1902)
Spodoptera littoralis (de Boisduval 1833)
Tumidifrontia casteneotincta Hampson 1902 Km 9T 2

Catocalinae

Achaea finita (Guenee 1852)
Anomis flava (Fabricius 1775)
Anomis sobulifera Guenee 1852
Anticarsia irrorata (Fabricius 1781)
Audea fatilega (Felder & Rogenhoffer 1874)
Cyligramma latona (Cramer 1775
Davea humeralis (Hampson 1902))
Dysgonia angularis de Boisduval 1833
Dysgonia derogans (Walker 1858)
Ericeia inangulata (Guenee 1852)
Gracilodes caffra Guenee 1852
Halochroa eudela Fletcher DS 1963
Heliophisma maculilinea
Hypersypnoides congoensis Berio 1854
Hypocala deflorata (Fabricius 1794)
Hypropra capensis (Herrich-Schaffer 1850)
Maxera marchalii (de Boisduval 1833)
Mocis undata (Fabricius 1775)
Ophiusa tirhaca (Cramer 1780)
Oraesia emarginata Fabricius 1794)
Orthreis divitiosa Walker 1869
Orthreis fullonia (Clerck 1764)
Orthreis materna (Linnaeus 1767)
Pandesma robusta (Walker [1858])
Rhandiphora cinctigutta (Walker 1862)
Remiga repanda (Fabricius 1794)
Serrodes partita (Fabricius 1775)
Sphingomorpha chlorea (Cramer 1777)
Trigonodes hyppasia (Cramer 1779)
Ulothrichopus hardyi Clifton

Eutellinae
Caligatus angasii Wing [1850]
Eutelia bowkeri (Felder & Rogenhoffer 1874)

Hadeninae
Brithysana speyeri (Felder & Rogenhoffer 1874)
Diaphone eumela (Stoll 1781)
Diaphone lampra Karsch 1894)
Leucania prominenus Walker 1856
Leucania tacuna (Felder 1874)
Leucania uncinata (gaede 1916)
Rougeotia praetexta Townsend
Vietteania torrentium (Guenee 1852)

Heliothinae
Helicoverpa armigera (Hubner [1809])
Heliothis xanthiata Walker 1865

Hypeninae
Dichromia mesomeleana (Hampson 1902)
Hypena laetalis Walker [1859]
Hypena senialis Guenee 1854
Hypena srtigata (Fabricius 1798)
Rhynchina tinctalis (Zeller 1852)

Noctuinae
Agrotis segatum (Dennis & Schiffermuller 1775)
Agrotis contiguens (Warren 1914)
Amazonides ruficeps (Hampson 1903)
Mentaxya atritegulata (Hampson 1902)
Mentaxya ignicollis (Walker 1857)

Plusiinae
Chrysodexis acuta (Walker 1858)
Plusia fracta Walker 1858
Plusia limbiralea Guenee
Plusia sestertia (Felder & Rogenhoffer 1874)
Syngrapha circumflexa (Linnaeus 1767)
Tricoplusia orichalcea (Fabricius 1775)

Sarrothripinae
Blenina albifascia Pinhey 1968
Blenina squamifera (Wallengren 1860)

Notodontidae

Achaera ochribasis (Hampson 1910)
Antheua simplex Walker 1855
Cerurina marshalli (Hampson 1910)
Chlorocalliope calliope (Hampson 1910)
Clostera violacearia (Janse 1920)
Desmeocaria congoana Auivillius 1900
Disracha persimilis (Hampson 1910)
Hampsonita esmeralda (Hampson 1910)
Heraia thalassina (Hampson 1910)
Odontoperas voeltzkowi Aurivillius
Polienus albescens Gaede
Scalmicauda bicolorata Gaede
Scalmicauda tessmanni Strand 1911
Tronotus bettoni Butler 1898

Pterophoridae

Pterophorus candidalis (Walker 1864)

PYRALOIDEA

Crambidae

Musotiminae
Panoctima angustalis Hampson

Noordinae
Viettessa margaritalis (Hampson 1910)

Nymphulinae
Argyractis sambesica (Strand 1909)

Pyraustinae
Calamochrous flavimarginalis Hampson 1913
Loxostege plumbialis (Zeller 1852)
Loxostege venustalis Cramer 1782
Pyrausta incoloralis (Guenee 1854)
Uresiphita polygonalis (Dennis & Schiffermuller 1775)

Spilomelinae
Aetholessa floridalis (Zeller 1852)
Bocchoris inspersalis (Zeller 1852)
Dichocrocis polystidzalis Hampson 1918
Epipagis cancellalis (Zeller 1852)
Eurrhyparodes tricoloralis (Zeller 1852)
Filodes costivitralis Guenee 1862
Ischnurges lancinalis (Guenee 1854)
Maruca vitrata (Fabricius 1787)
Marwitzia centiguttalis Gaede
Nausinoe argyrosticta (Hampson 1910)
Nausinoe geometralis (Guenee 1854)
Pagyda salvalis Walker 1859
Pagyda traducalis (Zeller 1852)
Palpita unionalis (Hubner 1796)
P1lochrosis dichocrosialis Hampson 1912
Spoladea recurvalis (Fabricius 1775)
Syllepte ovalis (Walker 1859)

Syllepte purpurascens Hampson 1899
Syllepte sinuata Fabricus
Synclera traducalis (Zeller 1852)
Syngamia convulsa Meyrick
Syngamia fervidalis Zeller 1852

Pyralidae

Phycitinae
Cadra cautella (Walker 1863)
Dysphilia viridella Ragonot 1888

Pyralinae
Aglossa rhodalis Hampson 1906

Saturniidae

Athletes gigas Sonthonnax 1904
Athletes semialba Sonthonnax 1904
Aurivillius seydelli Rougeot 1962
Bunaea alcinoe (Stoll 1780)
Cirina forda (Bouvier 1927)
Decachorda fulvia (Druce 1886)
Decachorda rosea Aurivillius 1898
Epiphora imperator Stoneham 1933
Gynanisa carcassoni Rougeot 1974
Holocerina smilax (Westwood 1849)
Imbrasia conradsi (Rebel 1906)
Imbrasia ertli Rebel 1904
Imbrasia macrops (Rebel 1917)
Imbrasia macrothyris (Rothschild 1906)
Imbrasia murphyi (Darge 1992)
Imbrasia rectalineata (Sonthonnax 1899)
Imbrasia wahlbergi (Boisduval 1847)
Lobobunaea christyi falcatissima Rougeot 1962
Ludia delegorguei (Boisduval 1847)
Ludia orinoptena Karsch 1892
Micragone joiceyi nyassae Rougeot 1962
Orthogonioptilum adiegatum dollmanni Jordan 1922
Pseudaphelia ansorgei (Rothschild 1898)
Pseudobunnaea callista Jordan 1910
Pseudobunnaea irius Fabricius 1793
Pseudobunnaea tyrrhena maculata Bouvier 1930
Tagoropsis hannintoni Butler 1893
Ubaena dolabella (Druce 1886)

Sphingidae

Acherontia atropus (Linnaeus 1758)
Agrius convolvuli (Linnaeus 1758)
Andriasa contraria contraria Walker 1856
Andriasa mitcheli Hayes 1973
Basiothia charis (de Boisduval [1875])
Basiothia medea (Fabricius 1781)
Basiothia schenki Moschler 1872
Cephanodes hylas virescens (Wallengren 1858)
Chaerocina dohertyi meridionalis Carcasson 1968
Coelonia fulvinotata (Butler 1875)
Daphnis nerii Linnaeus 1758
Dovania poecila Rothschild & Jordan 1916
Euchloron megaera Linnaeus 1758
Falcatula falcatus Rothschild & Jordan 1903
Hippotion celerio (Linnaeus 1758)
Hippotion eson (Cramer 1779)
Hippotion osiris (Dalman 1823)
Leptoclanis pulchra Rothschild & Jordan 1903
Leucophlebia afra Karsch 1891
Leucostrophus alterhirundo D'Abrera 1987
Lophostethus dumolinii dumolinii (Angas 1849)
Macroglossum trochilus (Hubner 1823)
Macropoliana ferax (Rothschild & Jordan 1916)
Neopolyptychus compar Rothschild & Jordan 1903
Nephele accentifera Beauvois 1805
Nephele comma Hopffer 1857
Nephele lannini Jordan 1926
Nephele vau (Walker 1856)
Polyptychopsis marshalli (Rothschild & Jordan 1903)
Polyptychus baxteri Rothschild & Jordan 1907
Polyptychus coryndoni Rothschild & Jordan 1903
Pseudoclanis kenyae Clark 1928
Rhodafra marshalli Rothschild & Jordan 1903
Sphingonaepiopsis ansorgei Rothschild 1904
Temnora burdoni Carcasson 1968
Temnora elegans polia Rothschild 1904
Temnora funebris (Holland 1893)
Temnora plagiata fuscata Rothschild & Jordan 1902
Temnora pseudopylas Rothschild 1894
Temnora pylades tanganyikae Clark 1928
Temnora marginata (Walker 1850)
Theretra orpheus (Herrich-Scaffer 1854)

Thyretidae

Automolis laterita Herrich-Schaffer 1855
Automolis pallens Bethune baker
Thyretes negus Wallengren

Yponomeutidae

Yponomeuta strigillata Zeller 1852

Zygaenidae

Saliunca esmeralda
Saliunca styx (Fabricius 1775)

RHOPALOCERA (BUTTERFLIES)

Hesperiidae

Abantis paradisea (Butler 1870)
Abantis zambesiaca (Westwood 1874)
Acada biseriatus (Mabille 1893)
Acleros mackenii (Trimen 1868)
Ampitta capenas capenas (Hewitson 1863)
Artitropa milleri Riley 1925
Artitropa reducta Aurivillius 1925
Borbo borbonica borbonica (Boisduval 1833)
Borbo fallax (Gaede 1916)
Borbo gemella (Mabille 1884)
Borbo micans (Holland 1896)
Borbo perobscura (Druce 1912)
Borbo sirena (Evans 1937)
Calleagris hollandi (Butler 1897)
Calleagris jamesoni jamesoni (Sharpe 1890)
Celaenorrhinus galenus (Fabricius 1793)
Celaenorrhinus handmani Berger 1976
Celaenorrhinus zanqua Evans 1937
Chondrolepis telsignata (Butler 1896)
Coeliades forestan (Stoll 1872)
Coeliades pisistratus (Fabricius 1793)
Fresna nyassae (Hewitson1878)
Gegenes niso brevicornis (Plotz 1884)
Gomalia elma (Trimen 1862)

Gorgyra bibulous Riley 1929
Gorgyra johnstoni (Butler 1894)
Kedestes barbarae barbarae (Trimen 1873)
Kedestes brunneostriga (Plotz 1884)
Kedestes callicles (Hewitson 1868)
Kedestes wallengrenii fenestratus (Butler 1894)
Metisella decipiens (Butler 1896)
Metisella formosus formosus (Butler 1894)
Metisella medea nyika Evans 1937
Metisella orientalis orientalis (Aurivillius 1925)
Metisella perexellens perexellens (Butler 1896)
Metisella quadrisignatus quadrisignatus (Butler 1894)
Meza larea (Neave 1910)
Parosmodes morantii morantii (Trimen 1873)
Platylesches ayresii (Trimen 1889)
Platylesches lamba Neave 1910
Platylesches picannini (Holland 1894)
Platylesches rasta rasta (Evans 1937)
Platylesches robustus robustus Neave 1910
Sarangesa astrigera Butler 1894
Sarangesa lucidella lucidella (Mabille 1881)
Semalea arela (Mabille 1891)
Semalea pulvina (Plotz 1879)
Spialia depauperata depauperata (Strand 1911)
Spialia dromus (Plotz 1884)
Spialia mafa mafa (Trimen 1870)
Spialia spio (Linnaeus 1764)
Tagiades flesus (Fabricius 1781)
Teniorhinus harona (Westwood 1881)
Zenonia zeno (Trimen 1864)

Papilionidae

Papilio dardanus tibullus Kirby 1880
Papilio demodocus demodocus Esper 1798
Papilio jacksoni nyika Cottrell 1963
Papilio mackinnoni isokae Hancock 1984
Papilio nireus lyaeus Doubleday 1845
Papilio ophidecephalus mkuwadzi Gifford 1961
Papilio pelodurus vesper Le Cerf 1924
Papilio phorcas nyikanus Rothschild & Jordan 1903
Graphium angolanus angolanus (Goeze 1779)
Graphium leonidas leonidas (Fabricius 1793)

Pieridae

Appias Sabina phoebe (Butler 1901)
Belenois aurota aurota(Fabricius 1793)
Belenois creona severina (Stoll 1781)
Belenois rubrosignata kongwana Talbot 1943
Belenois thysa (Hopffer 1855)
Belenois zochalia agrippinedes (Holland 1896)
Catopsilia florella (Fabricius 1775)
Colias electo Strecker 1900
Colotis antevippe gavisa (Wallengren 1857)

Colotis danae annae (Wallengren 1875)
Colotis dissociates (Butler 1897)
Colotis eris eris (Klug 1829)
Colotis euippe omphale (Godart 1819)
Colotis evenina casta (Gerstaecker 1871)
Colotis regina Trimen 1863
Eurema brigitta brigitta (Stoll 1780)
Eurema desjsrdinsii marshalli Butler 1898
Eurema hecabe solifera (Butler 1875)
Eurema mandarinula (Holland 1862)
Eurema senegalensis (Boisduval 1836)

Leptosia alcesta inalcesta Bernardi 1959)
Mylothris agathina agathina (Cramer 1779)
Mylothris crawshayi crawshayi Butler 1896
Mylothris ruppellii rhodesiana Riley 1921
Mylothris sagala dentatus Butler 1896
Nepheronia argia mhondana (Suffert 1904)
Nepheronia thalassina sinalata (Suffert 1904)
Pinacopteryx eriphia eriphia (Godart 1819)

Nymphalidae

Acraeinae
Acraea acrita Hewitson 1865
Acraea acuta Howarth 1969
Acraea aganice nicega (Suffert 1904)
Acraea anacreon bomba Grose-Smith 1889
Acraea caecilia pudora Aurivillius 1910
Acraea calderena calderena Hewitson 1877
Acraea encedon encedon (Linnaeus 1758)
Acraea epaea melina (Thurau 1903)
Acraea eponina (Cramer 1770)
Acraea goetzei Thurau 1903
Acraea insignis insignis Distant 1880
Acraea johnstoni johnstoni Godman 1885
Acraea leucopyga Aurivillius 1904

Acraea perenna thesprio Oberthur 1893
Acraea periphanes Oberthur 1893
Acraea pharsalus pharsaloides Holland 1892
Acraea pudorella detecta Neave 1910
Acraea scalivittata Butler 1896
Acraea ventura ventura Hewitson 1877
Hyalites parei orangica Henning 1996
Pardopsis punctatissima (Boisduval 1833)

Daninae
Amauris albimaculata latifascia Talbot 1940
Amauris crawshayi crawshayi Butler1897
Amauris echeria serica Talbot 1940
Amauris ellioti junia (Le Cerf 1920)
Danaus chrysippus eagyptus (Schreber 1759)
Tirumala Formosa formosa (Godman 1880)

Satyrinae
Aphysoneura pigmentaria obnubila Riley 1923
Bicyclus anynana anynana (Butler 1879)
Bicyclus campina campina (Aurivillius 1901)
Bicyclus cooksoni (Druce 1905)
Bicyclus cottrelli Van Son 1952
Bicyclus dancklemani (Rogenhoffer 1891)
Gnophodes betsimena diversa (Butler 1880)
Henotesia simonsii (Butler 1877)
Henotesia ubenica Thurau 1903
Melanitis leda helenae (Westwood 1851)
Melanitis libya Distant 1882
Neita extensa (Butler 1898)
Neocoenyra gregorii Butler 1894
Physcaeneura pione Godman 1880
Ypthimomorpha itonia (Hewitson 1865)

Argynninae
Issoria smaragdifera smaragdifera (Butler 1895)
Lachnoptera ayresii Trimen 1879
Phalantha aethiopica Rothschild & Jordan 1903

Nymphalinae
Antanartia dimorphica dimorphica Howarth 1966

Antanartia schaeneia dubia Howarth 1966
Catacroptera cloanthe cloanthe (Stoll [1781])
Cynthia cardui (Linnaeus 1758)
Junonia antilope (Feisthamel 1850)
Junonia archesia (Cramer 1779)
Junonia artaxia Hewitson 1864
Junonia cuama Hewitson 1864
Junonia hierta cebrene Trimen 1870
Junonia natalica (Felder 1860)
Junonia octavia sesames (Trimen 1883)
Junonia orithya orithya (Linnaeus 1758)
Junonia terea elgiva Hewitson 1864
Junonia touhilimasa Vuillot 1892
Junonia tugela aurorina Butler 1894
Salamis anacardii nebulosa Trimen 1881
Salamis parhassus (Drury 1782)
Vanessa cardui Linnaeus 1758

Limenitinae
Bebearia orientis orientis (Karsch 1895)
Byblia anvatara acheloia (Wallengren 1857)
Byblia ilithya (Drury [1773])
Crenidomimas concordia (Hopffer 1855)
Cymothoe cottrelli Rydon 1980
Cyrestis Camillus sublineata Lathy 1901
Euphaedra crawshayi Butler 1895
Eurytella dryope angulata Aurivillius 1898
Euritella hiarbas lita Rothschild & Jordan 1903
Hamanumida daedalus (Fabricius 1775)
Harma theobene blassi (Weymer 1892)
Neptidopsis ophione ophione (Cramer [1777])
Neptis alta Overlaet 1955
Neptis aurivillii Schultz 1930
Neptis incongrua incongrua Butler 1896
Neptis laeta Overlaet 1955
Neptis melicerta (Drury 1773)
Neptis saclava marpessa Hopffer 1855
Pseudacraea deludens murphyi Hecq 1991
Pseudacraea lucretia expansa (Butler 1878)
Pseudargynnis hegemone (Godart 1819)
Sallya amulia rosa (Hewitson 1877)
Sallya boisduvali boisduvali (Wallengren 1857)
Sallya garega (Karsch 1892)
Sallya morantii morantii (Trimen 1881)

Charaxinae
Charaxes achaemenes achaemenes Felder & Felder 1867
Charaxes acuminatus nyika Van Someren 1963
Charaxes ameliae amelina Joicey & Talbot 1925
Charaxes ansorgei levicki Poulton 1933
Charaxes aubyni australis Van Someren & Jackson 1957
Charaxes baumanni whytei Butler 1894
Charaxes bohemani Felder & Felder 1859
Charaxes brutus natalensis Staudinger 1885
Charaxes candiope candiope Godart 1924
Charaxes castor flavifasciatus Butler 1895
Charaxes dilutus veneris White & Grant 1989
Charaxes dowsetti Henning 1989
Charaxes druceanus proximans Joicey & Talbot 1922
Charaxes fione Henning 1977
Charaxes guderiana guderiana (Dewitz 1879)
Charaxes macclounii Butler 1895
Charaxes nichetes leoninas Butler 1895
Charaxes nyikensis Van Someren 1975
Charaxes phaeus Hewitson 1877
Charaxes pollux geminus Rothschild 1900
Charaxes protoclea azota (Hewitson 1877)
Charaxes varanes vologesis (Mabille 1876)
Charaxes violetta melloni Fox 1963
Charaxes xiphares ludovici Roussseau-Decelle 1933

Lycaenidae
Actizera lucida (Trimen 1883)
Actizera stellata (Trimen 1883)
Alaena nyassa major Oberthur 1888
Alaena reticulata Butler 1896
Aloedes conradsi angoniensis Tite & Dickson 1968
Aloedes griseus Riley 1921
Aloedes molomo handmani Tite & Dickson 1973
Anthene amarah amarah (Guerin-Meneville 1847)
Anthene definita definita (Butler 1899)
Anthene kersteni (Gerstaecker 1871)
Anthene lasti (Grose-Smith & Kirby 1894)
Anthene ligures (Hewitson 1874)
Anthene liodes (Hewitson 1874)
Anthene lunulata (Trimen 1894)
Anthene rubricinctus anadema (Druce 1905)
Aphnaeus erikssoni rex Aurivillius 1909
Aphnaeus marshalli Neave 1910
Axiocerces amanga amanga (Westwood 1881)
Axiocerces nyika Quickelberge 1984
Axiocerces punicea punicea (Grose-Smith 1889)
Axiocerces tjoane tjoane (Wallengren 1857)
Azanus jesous (Guerin 1847)
Azanus mirza (Plotz 1880)
Azanus moriqua (Wallengren 1857)
Azanus natalensis (Trimen 1887)
Cacyreus lingeus (Stoll 1782)
Cacyreus palemon (Stoll 1782)
Cacyreus virilis Stempffer 1936
Capys brunneus brunneus Aurivillius 1916
Capys connexivus connexivus Butler 1987
Cupidopsis cissus (Godart 1824)
Cupidopsis Jobates jobates (Hopffer 1855)
Deudorix antalus (Hopffer 1855)
Deudorix caerulea Druce 1890
Deudorix camerona Katanga Clench 1965
Deudorix dinochares Grose-Smith 1887
Deudorix kafuensis Neave 1910
Deudorix lorisona coffea Jackson 1966
Deudorix magda Gifford 1963
Deudorix Montana (Kielland 1985)
Deudorix zeloides Butler 1901
Eicochrysops eicotrochilus Bethune-Baker 1924
Eicochrysops messapus mahallakoaena (Wallengren 1857)
Euchrysops barkeri (Trimen 1893)
Euchrysops dolorosa (Trimen 1887)
Euchrysops subpallida Bethune-Baker 1923
Euchrysops unigemmata (Butler 1895)
Harpendyreus hazelae Stempffer 1973
Harpendyreus juno (Butler 1897)
Harpendyreus marungensis marungensis (Joicey & Talbot 1924)
Hemiolaus caeculus caeculus Hopffer 1855
Hypolycaena buxtoni Hewitson 1874
Hypolycaena auricostalis auricostalis (Butler 1897)
Hypolycaena pachalica Butler 1888
Hypolycaena philippus philippus (Fabricius 1793)
Iolaus (Epamera) alienus alienus Trimen 1898
Iolaus (Stugeta) bowkeri nyasana (Talbot 1935)
Iolaus (Epamera) congdoni Keilland 1985
Iolaus (Argiolaus) lalos lalos (Druce 1896)

Iolaus (Epamera) nasisii (Riley 1928
Iolaus (Argiolaus) pamelae Heath 1983
Iolaus (Epamera) sidus Trimen 1864
Iolaus (Argiolaus) silarus Druce 1885
Iolaus (Argiolaus) stewarti Heath 1985
Iolaus (Epamera) violacea (Riley 1928)
Lachnocnema bibulus (Fabricius 1793)
Lachnocnema durbani Trimen 1887
Lampides boeticus (Linnaeus 1767)
Lepidochrysops chalceus Quickelberge 1979
Lepidochrysops cupreus (Neave 1910)
Lepidochrysops desmondi Stempffer 1951
Lepidochrysops handmanni Quickleberge 1980
Lepidochrysops intermedia cottrelli Stempffer 1954
Lepidochrysops nyika Tite 1961
Lepidochrysops solwezi (Bethune-Baker 1922)
Leptotes jeanneli (Stempffer 1935)
Leptotes marginalis (Stempffer 1944)
Leptotes pirithous pirithous (Linnaeus 1767)
Lycaena phlaeas abbottii (Holland 1892)
Mimacraea marshalli marshalli Trimen 1898
Ornipholidotes peucetia peucetia (Hewitson 1866)
Pentilla tropicalis (Boisduval 1847)
Phlaria heritsia virgo (Butler 1896)
Spindasis mozambica (Bertolini 1850)
Triclema nigeriae (Aurivillius 1905)
Tuxentius calice calice (Hoppfer 1885)
Tuxentius ertli (Aurivillius 1907)
Pseudonacudaba sichela sichela (Wallengren1857)
Uranothauma antinorii felthami (Stevenson 1934)
Uranothauma cordatus (Sharpe 1892)
Uranothauma crawshayi Butler 1895)
Uranothauma cuneatum Tite 1953
Uranothauma falkensteni (Dewitz 1879)
Uranothauma nubifer (Timen 1895)
Uranothauma poggei (Dewitz 1879)
Uranothauma vansomereni Stemffer 1951
Uranothauma williamsi Carcasson 1961
Zizeeria Knysna (Trimen 1862)
Zizula hylax (Fabricius 1775)

Riodinidae

Abisara neavei cf congdoni Keilland 1985

HYMENOPTERA (BEES & WASPS)

Bees

Anthrophoridae

Amegilla acraensis Fabricius1793
Amegilla torrida Smith
Anthrophora plumipes Fabricius
Mesotrichia flavorufa D & G
Xylocopa caffra Linnaeus 1767
Xylocopa corinata Smith 1874
Xylocopa flavobicincta Grib
Xylocopa lugubris Gerstaecker 1857
Xylocopa nigrita (Fabricius 1775)
Xylocopa senior senior (Vaehal 1899)

Apoidae

Apis mellifera monticola Smith
Apis mellifera scutellata Lepeltier
Thyreus abyssinicus (Radoszkowsky)
Thereus calceatus (Vaehal)

Megachilidae
Chalicodoma bombifrons (Gerstaecker 1857)
Chalicodoma pseudomegachile kigonserana (Friese 1903)
Megachile felina Gerstaecker

Wasps

Brachonidae

Archbracon servillei Brulle
Serraulax decemmaculatus Szepligeti 1911

Ichneumonidae

Asprynchotus guenzii (Tasch)
Enicospilus pacificus

Mutillidae

Stenomutilla cf beroe Peringuey

Pompilidae

Anopilus fuscus
Hemipepsis dedjas Guerin
Hemipepsis imperialis Smith
Hemipepsis ochropus Stal
Hemipepsis tamisieri Guerin
Psammochares plumbeus Fabricius
Psammochares cf semirufus Haupt
Pseudogenia flavotegulata Bingh

Scolidae

Campsomeris hymenaea Gerst
Megameris labilis Schulz 1906
Scolia erithropyga
Scolia morio Fabricius
Scolia Tropicana nigersima

Sphecidae

Ammophila benniensis (Palisot de Beauvois)
Ammophila punctaticeps (Arnold)
Chalybion laevigatum Kohl
Chlorion haemorrhoidalis Fabricius
Chlorion pelopoeformis Dahlboom
Liris pempesiana Bisch
Philanthus stygius Gerstaecker
Philanthus triangulatum diadema Fabricius
Podolonia tydei Le Guillay
Scelifron spirifex Linnaeus
Trachysphex ambiguous Arnold 1923

Vespidae

Ancistrocerus lineaticollis Cam
Antipiona silgos (Saussure)
Belognaster clypeata Kohl 1894
Belognaster dubius Kohl
Belognaster fascialis du Buysson 1906
Belognaster filiventris Saussure 1853
Belognaster griseus Fabricius
Belognaster laevigatum Kohl
Belognaster nobilis Gerstaecker
Belognaster vasseae du Buysson 1906
Delta emarginata
Delta pulchemimum
Eumenes maxillosus De Geer

Odynerus ardens var junodi Gribodo 1895
Odynerus radialis Saussure 1854
Odynerus ventralis Saussure
Polistes marginalis Fabricius
Polistes smithi Saussure
Trachymeus cf vulneratus
Synagris prosperina niassae Stadel

Formicoidae (Ants)

Separate report by Dr C.B.Cottrell Biosearch Nyika 1999 report

Entomologist Ray Murphy showing the team some of the African insects they might find on the Nyika *Marianne Overton*

Collage below by Marianne and Michael Overton

NYIKA GRASSHOPPERS

Dr Karim Vahed

Collected by K. Vahed, July/ August 2003
Identified by Drs.Stuart Green & K. Vahed

Specimens identified so far:

Family Acrididae

Sub-family Coptacridinae
Poecilocerastis tricolour (Bolivar 1912)

Sub-family Eyprepocnemidinae
Metazymecus (*Tylotropidius*) *gracilipes* (Brancsik, 1895)

Sub-family Catantopinae
Phaeocatantops sp (poss *galuningi*)
Anthermus eberni (Rame 1929)
Abisares viridipennis (Burmeister 1838)

Sub-family Oedipodinae
Morphacris fasciata (Thunberg 1815)
Oedalius sp

Sub-family Acridinae
Machaeridia bilineata (Stal 1873)
Cannula gracilis (Burmeister 1838)

Sub-family Cyrtacanthacridinae
Bryophyma tectifera (Karsh 1897)
Ornithacris sp (possibly *O. cyanea* Stoll 1813)

Sub-family Gomphocerinae
Faureia milanjica (Karsch 1896)
Pseudoarcyptera cephalica (Bolivar 1914)
Dnopherula sp.

Sub-family Leptacridinae
Leptacris monteiroi monteiroi (Bolivar 1890)

Sub-family Tropidopolinae
Afroxyrrhepes sp

Family Pamphagidae

Sub-family Porthetinae
Lobosceliana sp

Family Pyrgomorphidae

Phymateus sp. (i.d from photo, 2006 expedition)
Dictyophorus sp. (ditto)
Taphronota sp (ditto)

Michael Overton

MEMORIES

Seven members of the Wye College 1972 team, whose pioneer expedition focused on the northern hill zone of what is now part of the Nyika National Park. They are from left to right: Richard Symes, Pandora Thoresby, Bob Berry, Anne Hargreaves, Peter Overton, John Nursaw and Dr Dick Brummitt.

The group met for a 34-year reunion in October 2006 in Lincolnshire, UK at the Biosearch Expedition base. Unfortunately Sam Kent, the 1972 leader, and Hugh Synge, botanist, were unable to attend but are fit and well. Malawian members of the team, David Munthali and David Nsyaludzu were not contactable but we hope that if they see this picture they will get back in touch through Biosearch Expeditions and attend the next event. Hassam Patel, stalwart of many of the expeditions over the past ten years was also on the 1972 team as a herbarium assistant from Chancellor College. He has since twice visited the UK at the invitation of Peter and Marianne Overton.

It was with great sadness that we heard of the death, on 27 January 2007, of Kingfrey Sichinga. Kingfrey worked for the department for nearly 20 years. He had been a popular scout on three of our expeditions and many of the team will have happy memories of him chatting by the fireside in the wilderness and imparting his own version of wisdom. We offer our condolences to his wife and children and to all his colleagues, who will miss him greatly.

Kingfrey Sichinga *Quincy Connell*