

Meerkats of the Kalahari

EXPEDITION BRIEFING

Dear Volunteers,

Welcome to the *Meerkats of the Kalahari* expedition! We have been working on our study population in the Kuruman River Reserve now for more than 10 years. As a result, almost all of the meerkats in our study group are well used to humans and our meerkat population provides a unique opportunity to investigate the evolutionary causes and ecological consequences of cooperation in mammals. We have been able to use this relationship to ask and answer a wide range of questions about animal cooperation that have not been previously accessible. You will work with members of an established group of researchers drawn from several countries who are already taking advantage of the unusual opportunities provided by these animals.

In addition to our scientific work on the meerkats, we are also monitoring plant and animal populations throughout the reserve and are involved in outreach to the local community in connection with problems of conservation and sustainable use of resources.

This briefing should provide you with all the information you need to prepare for your expedition, but feel free to contact Earthwatch with any questions. Upon arrival in Upington, you will be met by Helene Brettschneider, Field Coordinator for the Earthwatch meerkat project. Helene and all of the associated scientists on site will be happy to help with more information.

We are all most grateful to you for your help and I hope that you will find your time with the project interesting, rewarding and fun.

Yours,

Tim Clutton-Brock

Meerkats of the Kalahari

Table of Contents

GENERAL INFORMATION.....	3
THE EXPEDITION	4
1. PROJECT OVERVIEW.....	4
2. RESEARCH AREA.....	5
3. PROJECT STAFF.....	5
DAILY LIFE IN THE FIELD	7
4. TEAM ITINERARY	7
5. DAILY SCHEDULE AND TASKS.....	7
6. VOLUNTEER FIELD TRAINING AND ASSIGNMENTS.....	8
7. ACCOMMODATIONS.....	9
8. FOOD.....	9
TRAVEL PLANNING.....	10
9. BEFORE YOU LEAVE	10
10. PROJECT CONDITIONS.....	13
11. HEALTH INFORMATION	16
12. PACKING CONSIDERATIONS.....	17
13. RECOMMENDED READING	18
14. EMERGENCIES IN THE FIELD	19
15. HELPFUL RESOURCES	19
THE RESEARCH.....	22
16. BACKGROUND, OBJECTIVES AND METHODS	22
17. RESULTS AND OPPORTUNITIES	24
18. LITERATURE CITED	24
EXPEDITION PACKING CHECKLIST.....	27

GENERAL INFORMATION

PRINCIPAL INVESTIGATOR: 1) **Dr. Timothy H. Clutton-Brock**
2) **Dr. Marta Manser**

POSITION/TITLE: 1) Professor of Animal Ecology
2) Associate Professor of Animal Behavior

AFFILIATION: 1) University of Cambridge
2) University of Zurich

PROJECT TITLE: **Meerkats of the Kalahari:** Cooperation and competition in Kalahari mammals

RESEARCH SITE: Kuruman River Reserve, Northern Cape, South Africa

TEAM LENGTH: 14 days

TEAM SIZE: Minimum: 3 Maximum: 6

MINIMUM AGE OF PARTICIPATION: 16 *See Section 9 '*Before You Leave*' for important information

THE EXPEDITION

1. PROJECT OVERVIEW

"This project made me fall in love with meerkats!"

~ Margaret Starkey, Team I, March 2005

The primary aim of the project is to investigate the evolutionary causes and ecological consequences of cooperative breeding in mammals. Subsidiary aims are to determine the factors affecting the distribution of reproductive success among males and females, and the behavioral and physiological mechanisms controlling reproduction and cooperative behavior. The meerkat project works with a number of very well habituated meerkat groups. It's possible to walk with these groups while they are foraging, and for the research staff to touch and weigh almost all of the members. These focal groups allow us to collect very detailed behavioral data. There are currently 13 focal groups (approximately 290 meerkats) at the Kuruman River Reserve (KRR) study site. Six habituated groups reside exclusively within the boundaries of KRR, while the ranges of the other study groups extend over a number of neighboring farms. Earthwatch volunteers will work exclusively on groups that stay within the reserve boundaries.

The project aims to keep accurate life history records for each animal in the population with the help of mark-identification sheets. Births, deaths, pregnancies, the onset and conclusion of lactation and oestrus, changes in dominance status and even short-term absence from a group are regarded as important data.

Earthwatch volunteers will be broken into groups and partnered with project staff. Each group will work together to:

- Help to establish group composition (essentially a sort of roll-call) at the start and end of each session, and if possible, at regular intervals during the session itself (animals may temporarily become separated from the rest of the group)
- Take note of any signs of pregnancy (abdominal swelling), lactation (prominent nipples), dominance interactions, aggressive encounters, etc.
- Keep a sharp look out for injuries or signs of disease (e.g. tuberculosis lumps)

Adlib data is also routinely collected by the project, which involves recording any noteworthy behavior or activity (i.e. anything other than normal foraging behavior). Meerkat researchers are trained to recognize and interpret a wide range of behaviors, and to record them in a standardized format using hand-held Psion computers. Earthwatch volunteers are not expected to record standard adlib data – this will be handled by your staff partner. However, at busy times it can be difficult to enter accurate data on the Psion and still keep an eye on the ongoing behaviors. At these times it is very useful to have an additional observer to keep track of which animals are doing what, and to or with whom. Earthwatch volunteers will also be expected to collect additional data, independently from project staff. This is discussed further in Section 6 *'Volunteer Field Training and Assignments.'*

You will spend many hours in the field each day. Conditions in the Kalahari can range from very hot to icy cold, and while the meerkats are also not too fond of extreme temperatures, they do have to forage. A minimum of 3 hours every morning and 1 ½ hours in the evenings is spent walking in the field. Volunteers should expect to spend long periods of time on foot, and it is not

unusual to have to run after groups when they have interactions with their neighbors. It is therefore very important that Earthwatch volunteers be able to move swiftly over hilly and sandy terrain, as keeping up with the meerkats to collect data is of top priority. Meerkats also move through fences, meaning you will sometimes have to quickly climb over them to keep up!

2. RESEARCH AREA

Climate and Terrain

The Kuruman River Reserve covers 32 km²/20 mi² of semi-arid dune country on either side of the dry bed of the Kuruman River in the South African Kalahari. Vegetation consists of scattered camel thorn trees (*Acacia erioloba*) along the river bed, grading out into dry scrub dominated by annual and perennial grasses and *Rhigozum* scrub. There is around 250 mm/10 in of rain a year, mostly falling between October and March. In the summer (October-March), temperatures range from midday highs in the low 40s°C/100+°F (November-December) to nighttime lows of around 20°C/68°F. Temperatures are lower in winter (April-September) and often fall below 0°C/32°F at night in the coldest month (July). People working in the reserve generally rest during the hottest time of day. Humidity is typically very low and nighttime temperatures are usually comfortable.

The topography of the reserve consists of vegetated (“fossil”) dunes covered with grasses and separated by valleys up to 300 m across. The dunes flatten as they approach the bed of the Kuruman River, which is usually dry. The reserve carries gemsbok, blue wildebeest, eland, red hartebeest, springbok, duiker, steenbok, bat-eared foxes, porcupines and three mongooses (meerkats, slender and yellow mongoose) but not large carnivores. There is a diverse bird fauna representative of the Kalahari, including substantial populations of social weavers and pygmy falcons.

Cultural, Social and Political Environment

The reserve is situated in the Northern Cape, a predominantly Afrikaans-speaking province of South Africa. The area surrounding the reserve is owned by sheep and cattle farmers, who are very friendly and hospitable, but generally fairly conservative. The closest village to the reserve is Van Zyl’s Rus, a small settlement that provides services to the local farmers and their workers. Crime in the area is not a big problem, although petty theft might be an issue in Van Zyl’s Rus.

3. PROJECT STAFF

We usually have around 20 Ph.D. students volunteering as meerkat project staff members at any given time, but those present will change regularly. Principal Investigator Dr. Clutton-Brock and Co-Principal Investigator Dr. Marta Manser will visit the project site on occasion and may not be present for all Earthwatch teams. Field Coordinator Helene Brettschneider and Field Manager Thomas Flower will be onsite at all times.

PRINCIPAL INVESTIGATORS

Dr. Tim Clutton-Brock, Principal Investigator, is a Professor of Animal Ecology at the University of Cambridge. He has worked on the ecology of mammals (including primates, ungulates and carnivores) for over 30 years and has written more than 200 papers and several books on the ecology and behavior of mammals. He was the co-founder of the Tropical Biology Association, which teaches ecology, conservation biology and evolution to mixed groups of students from

Europe and Africa, and is currently its president. He directs research at the Kuruman River Reserve and was responsible for its establishment. Dr. Clutton-Brock typically spends two months a year (March and September) at the reserve working on the meerkat project.

Dr. Marta Manser, Co-Principal Investigator, is an Associate Professor in Animal Behavior at Zurich University. Her principal interest is in animal communication and cognition.

FIELD COORDINATORS

Helene Brettschneider, Field Coordinator, is originally from Namibia and has a B.Sc. degree. She is currently completing a Master's in Entomology at Pretoria University. She will be at the research site with each team and will provide guidance for volunteers on a day-to-day basis.

Thomas Flower, Field Manager of the meerkat project and the reserve, has a B.Sc. degree in Zoology from Bristol University in the UK. He will be available to volunteers during the project, though the organization of activities for the Earthwatch teams will be Helene's responsibility.

ADDITIONAL STAFF AND STUDENTS

There are usually 10-15 students, staff and volunteers working on different research projects in KRR. They typically include a South African technician responsible for the logistics of the meerkat project, 6-8 post-graduate interns from Europe or South Africa, one or two Ph.D. students and one or two independent post-docs carrying out their own research. Research staff in KRR change throughout the year but there are seldom less than 10 people working in the reserve at a time.

The project gives preference to South African applicants for intern placements and attempts to have one to three South Africans working in KRR. The interns' time with the project teaches them a range of logistical skills (including radio-tracking) as well as research design, data handling and analysis. They also have the opportunity to carry out a supervised project of their own. Interns usually have a degree or diploma in Biology, Ecology or Environmental Management.

DAILY LIFE IN THE FIELD

4. TEAM ITINERARY

Day 1:	Rendezvous in Upington, drive approximately 3½ hours to study site at Kuruman River Reserve
Days 2-5:	Meerkat work (all project work will take place within the reserve)
Day 6:	Day off*
Day 7:	Workshop/discussion on environmental issues relevant to the region; hands-on group activity
Day 8:	Biodiversity surveys
Day 9:	Environmental outreach (varied, but will likely involve interaction with local schoolchildren or townspeople)
Days 10-12:	Meerkat work
Day 13:	Day off*
Day 14:	Return to Upington by mid-morning

* During days off, volunteers will be free to take unguided walks within the reserve if so desired. Volunteers should consult a travel guidebook for information on local attractions. See Section 15 'Helpful Resources'.

5. DAILY SCHEDULE AND TASKS

Volunteers should be aware that schedules can be affected by weather and work conditions, and are likely to fluctuate. For example in summer (September - April), research begins earlier and there will likely be a longer midday break. In winter (May - August), dawn is later, dusk is earlier, and the team will have a shorter midday break. The following is a sample schedule:

Early morning:	Breakfast, preparation for day's activities
Morning:	Session with meerkats, transect surveys
Midday:	Processing of data, lunch, siesta
Afternoon:	Session with meerkats/transect surveys
Evening:	Dinner
Later evening:	Night drive, informal talk presented by resident researcher, free time

6. VOLUNTEER FIELD TRAINING AND ASSIGNMENTS

“Conservation projects such as mesquite control and vegetation surveys really made me understand the importance of nature around us and how we need to adapt. The meerkats put the icing on the cake with all of their wonderful personalities.”

~ Brant Adamczyk, Team IV, May 2005

Each three to six-person team will:

- Spend eight days helping collect data on cooperative behavior and ranging behavior in meerkat groups
- Spend two days conducting transect surveys to document the abundance and spatial distribution of bird colonies, termite mounds, and the burrows of certain large mammals such as aardvark, aardwolf and porcupine

In the course of work on meerkats, the volunteers will be allocated to different sub-teams and will assist different staff members on the project. During transect surveys, teams will be split into two sub-teams of two or three members that will work separately.

Volunteers will be trained to:

- Navigate and record spatial movements using handheld GPS devices
- Conduct scans and focals to monitor various aspects of meerkat behavior
- Collect and catalog behavioral data using datasheets
- Carry out transect-based surveys to assess the diversity, density and distribution of organisms contained within the reserve
- Identify organisms to species level using a range of published field guides

Project staff will provide volunteers with informal lectures or onsite briefings on local fauna and flora, the ecology of the Kalahari region, and the evolution and ecology of cooperative breeding in birds and mammals.

Potential Hazards Associated with Fieldwork

The Kuruman River Reserve stocks many large ungulate species that are found naturally in the Kalahari environment. However, for obvious reasons, no large carnivores are found on the reserve, so wildlife poses no threat to project staff or volunteers. When out in the field, it is not unusual to encounter various species of venomous and non-venomous snakes. Volunteers and staff are briefed on the correct procedures for dealing with snake bites, and measures are in place to deal with such emergencies. Scorpions are often seen when walking around the farmhouse in the evenings. It is a project rule that closed-toe shoes must be worn at night, which greatly reduces the chances of being stung or bitten. In the winter months, snakes and scorpions are far less prolific.

As volunteers will be spending extended periods out in the field, issues such as dehydration and heat exhaustion are fairly relevant. Volunteers are encouraged to take at least 2 liters of water into the field and to make sure to stay hydrated. A sun hat, sunblock and sunglasses are also strongly recommended. In winter, mornings spent waiting at the burrow for the meerkats to emerge can be very chilly. In addition, Earthwatch volunteers will do a night drive in an open vehicle on one of the evenings. For these times, a woolly hat and warm jacket are a must.

More information on project hazards can be found in Section 10 ‘Project Conditions.’

7. ACCOMMODATIONS

Volunteers will be accommodated individually in thatched, brick and mortar huts (rondavels) approximately 4 m in diameter. Each rondavel is supplied with electricity (220V, takes South African standard three-prong plugs), lighting and cold water, while a separate ablution block provides flush toilets and hot showers. The rondavels are equipped with bedding, towels, a fan, a small electric heater, an electric kettle, a desk and chair, and a reading lamp. It will be possible to wash laundry onsite. Although only single beds are available, rondavels can accommodate two single beds if couples so desire.

Volunteers will be transported to and from the study site and around the reserve in an air-conditioned 4 x 4 vehicle seating seven people. The journey between Upington and KRR (250 km/155 mi) takes approximately 3 ½ hours and consists mainly of gravel roads.

8. FOOD

Breakfasts and lunches will be self-serve and dinners will be prepared by staff at the reserve. Volunteers are, however, requested to contribute to food preparation at the final barbecue.

Here is a sampling of the foods you might expect in the field. Please bear in mind that variety depends on availability. This list is intended to provide a general idea of food types, but it is very important that volunteers be flexible.

Breakfast:	Muesli, toast and preserves, eggs (self-serve)
Lunch:	Sandwiches, salads, leftovers from previous meals (self-serve)
Dinner:	Pasta, fish or chicken dishes, weekly barbecue, traditional dishes
Snacks/Other:	Volunteers should purchase their own personal supply of snacks in Upington before departing for the study site
Beverages:	Tea, coffee and juice concentrate will be freely available; personal supplies of alcoholic beverages, soft drinks and pure fruit juices should be purchased by the volunteers in Upington before departing for the study site

Special Dietary Requirements

Please alert your Earthwatch Expedition Coordinator to any special dietary requirements as soon as possible (e.g. diabetic, lactose intolerant, etc.). Accommodating special diets is not guaranteed and can be very difficult due to availability, location and local conditions.

Special note to vegans and strict vegetarians: Please be aware that it is often difficult to accommodate strict vegetarians and vegans. It may be possible to get meatless meals but vegans and strict vegetarians may have a problem avoiding animal products altogether. If this poses a problem, then participation on an Earthwatch expedition should be seriously reconsidered.

TRAVEL PLANNING

9. BEFORE YOU LEAVE

For a listing of useful websites for passport and visa requirements see Section 15 'Helpful Resources.'

Passport Information

Most volunteers traveling from outside the host country will require a passport valid for at least six months beyond the dates of travel.

Visa Information

South Africa does not require visas from tourists originating from the United States, the European Community, Japan or Australia. However, all visitors from these countries must be in possession of a passport valid for at least six months past the date of entry and the passport must contain at least two blank (unstamped) pages. Those who do not comply with these requirements may be refused entry. Upon entry into South Africa, you will be granted a tourist visa that allows you to stay (but not work) in the country for 90 days. Citizens of other countries should check with their travel agent or a visa agency for specific visa and entry requirements.

Essential Information for Volunteers Requiring Visas

Type of Visa	You must get a TOURIST VISA .
Where to Get a Visa	Contact the nearest embassy or consulate of the country to which you are traveling to find out how to apply for your visa. Please note that this process can take weeks or more. If you have less than 6 weeks or wish to save yourself trouble, we strongly recommend using a visa agency , which can both expedite and simplify the process. See below for a list of visa agencies.
Required Information	You will need to send your passport (valid for at least 6 months beyond your stay), a Visa Application and Immigration Form , 2 to 4 passport-size photos plus payment to the embassy or visa agency (if applicable). Please be sure that your passport is valid for at least 6 months beyond your stay.
Cost of a Visa	Generally between US\$40-100, but varies from country to country and can potentially cost up to US\$180 . A visa agency will charge an additional fee (depending on the amount of time it takes to process the application), which you can inquire about directly.

Reminder: The purpose of your visit is for vacation, holiday or travel. Foreign immigration officials do not always understand the concept of a "working vacation" or even "volunteering." Words such as "working"/"volunteering," "research" or a "scientific expedition" can raise questions concerning the country's foreign labor laws and/or prompt questions about official scientific research permits and credentials, etc., to which volunteers on their own will not be equipped to respond. All required research permits for the project are in place and have been approved by the proper authorities.

Visa Agencies

IN THE UNITED STATES	IN EUROPE	IN AUSTRALIA
PassportVisaExpress.com 1911 North Fort Myer Drive, Suite 503 Arlington, VA 22209 Tel: +1 888 596-6028, +1 703 351-0992 Fax: +1 703 351-0995 Email: info@passportvisaexpress.com Website: http://www.passportvisaexpress.com	The Visaservice Tel: +44 (0) 8708 900 185 Fax: +44 (0) 20 7278 8464 Website: http://www.visaservice.co.uk Thames Consular Services Ltd Tel: +44 (0)20 8995 2492 Fax: +44 (0)20 8742 1285 Website: http://www.visapassport.com	Ask your travel agency if they can send your visa application on your behalf.

Volunteers Under 18 Years of Age

Entry to Foreign Countries

In an effort to prevent international child abduction many governments have initiated procedures at entry/exit points. Many countries require all persons under the age of 18 to have a notarized letter from all legal guardians stipulating that the person under 18 can travel unaccompanied or in the presence of only one guardian. This letter must give an explanation for why only one parent or someone other than a parent is signing the letter. For example, if one parent is deceased, only one parent has legal guardianship, or someone other than the parents are legal guardians, the letter should state that.

In addition, airlines may also have documentation requirements for unaccompanied minors. Parents of minors are responsible for checking with each airline that their child will be flying to ensure that sufficient documentation is provided. This could include a copy of a birth certificate or a notarized letter stating that the minor has his or her parent's permission to travel alone.

Note: Requirements by specific countries and airlines vary and change frequently. You MUST keep informed of the requirements on your own to avoid problems at immigration. If a letter is not available, the volunteer under 18 can be refused entry into the country. There is nothing Earthwatch Institute can do to help in this circumstance.

Cancellation Insurance

We highly recommend trip cancellation insurance, which will help cover your airfare if you are unable to travel. Earthwatch does not reimburse airfare or costs associated with cancelled flights. Check with your travel agent to find out how to obtain trip cancellation insurance.

Earthwatch Europe volunteers can purchase Additional Cancellation Cover for £10 as a supplement to the main premium that covers non-refundable travel expenses should your team be cancelled.

International Evacuation Insurance

The travel medical and evacuation insurance, coordinated by CEGA Group, is mandatory for all Earthwatch volunteers while on an Earthwatch expedition anywhere in the world. The insurance covers volunteer travel medical risk, including medical expenses and medical evacuation, while traveling with Earthwatch overseas or on an expedition within your home country. CEGA Group will also facilitate evacuation from the project site in the event of an emergency. Without insurance, the costs of such measures can be on the order of US\$20,000 to \$50,000.

CEGA Group provides a 24-hour emergency hotline for the use of insured persons under the Earthwatch program and can help with medical emergencies, doctor and hospital selection, obtaining additional medical options or medical translation problems. CEGA Group is backed by International SOS and Global Medical Management, who provide emergency medical evacuation and rescue services. The Earthwatch policy certificate number is US 0113. In addition, each individual policy is identified by the volunteer's Earthwatch ID number, shown above your name on your team list.

In an emergency - If you are calling from **outside of the US**, the number to call is: +44 (20) 8762 8015. You may call this number collect/reverse charges.

In an emergency - If you are calling from **inside the US**, the toll-free number to call is: +1 888 422-4747.

Basic coverage is valid in the country of your Earthwatch expedition and during international travel to and from your expedition. If the expedition takes place in your home country, coverage begins when your group forms for the expedition and ends when the group disbands, and is incremental to your existing health insurance. Options are available for volunteers who would like to extend the period of coverage, increase insurance amounts or purchase additional cancellation or baggage insurance.

A detailed description of the Volunteer Medical and Evacuation Insurance Program policy will be sent with this briefing. **Please note that policies are specific to each Earthwatch office.**

Travel Agencies

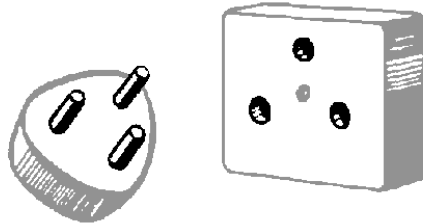
Contact your local travel agent or use the web to find the lowest rates to make your travel arrangements. A list of suggested travel agents can be found in Section 15 'Helpful Resources.' Be sure to give your rendezvous details to your travel agent as soon as possible so they can plan your trip accordingly.

The following agencies are familiar with Earthwatch projects and can assist you in making travel arrangements and booking hotels:

- Frosch International Travel
One Greenway Plaza, Suite 800
Houston, Texas 77046
Tel: +1 713 850 1566
+1 800 866-1623 (toll free)
Fax: +1 713 850.0027
Website: www.froschtravel.com
- Uniglobe Travel
Website: <http://www.onetravel.com/Air/AirSearch.aspx?module=Eair&DK=1000010265>

Other Advice / Information

- *Local currency:* South African Rand (R)
- *Electricity:* 220/230 V 50 Hz, large three-prong plug



- *Time zone:* GMT +2
- *Personal funds:* **Upington Airport does not offer facilities to exchange foreign currency** so volunteers are requested to make arrangements in this regard prior to arrival in Upington. Both Johannesburg and Cape Town International airports offer foreign exchange services. Spending money is recommended for the purchase of personal drinks/snacks and last minute supplies in Upington prior to departure for the study site, although a re-supply visit to the small town of Van Zylsrus may be possible during the expedition. Cash will also be required for any out-of-pocket expenses while on the project (e.g. private phone calls). Major credit cards are accepted at many of Upington's stores, but cash is recommended. ATMs are available in Upington but not at the field site or in Van Zylsrus.
- *Calling codes:* 27 (country code), 53 (Van Zylsrus city code), 54 (Upington city code), 11 (Johannesburg city code); when making calls from within South Africa, drop the country code (27) and dial 0 before the number
- *Emergency number in South Africa:* 112

10. PROJECT CONDITIONS

Please show this section to your physician when he/she is completing your health statement. Be sure to discuss inoculation requirements with your physician well in advance of your departure date. See Section 11 'Health Information' for inoculation information.

To the examining physician:

Your patient has volunteered to join a field research team that has specific physical demands of which you and your patient should be aware. **We need your accurate evaluation of your patient's ability to meet the conditions detailed below in order to safeguard his/her health and safety and ensure that he/she can participate fully and effectively.**

General Conditions of the Research Site

The terrain consists mostly of sandy dunes covered in scrub. Rainfall is concentrated into the summer months (typically December-March), but occasional light showers can occur at other times of the year.

Volunteers should be prepared to walk up to 5 km/~3 mi per day across rolling, scrub-covered dune fields. Very importantly, volunteers must be able to run short distances in sandy, hilly terrain and to potentially climb over high game fences in order to keep up with meerkat groups. Volunteers should be prepared to spend around six or seven hours in the field per day, during which time they may be exposed to strong direct sunlight and either subzero temperatures or fairly hot conditions (35°C/95°F or above).

Temperature Range			
<i>March</i>	11°C/52°F	to	39°C/102°F
<i>April</i>	6°C/43°F	to	35°C/95°F
<i>May</i>	0°C/32°F	to	31.5°C/89°F
<i>June</i>	-2°C/28°F	to	25.5°C/78°F
<i>July</i>	-4°C/25°F	to	26°C/79°F
<i>August</i>	-6°C/21°F	to	32°C/90°F
<i>September</i>	1.5°C/35°F	to	34°C/93°F
<i>October</i>	7°C/45°F	to	38°C/100°F
Altitude			
	1000 m/3,280 ft	to	2000 m/6,561 ft
Rainfall			
	250 mm/14 in	per	year
Humidity			
	Low		

Physical Demands

Volunteers will walk up to 5 km/~3 mi per day during both meerkat work and survey work. Generally this consists of slow ambling, but meerkats can cover ground quite quickly. Volunteers **must** be able to run after groups if necessary.

	Workload/Intensity	Time
Standing		Up to 6 hours per day
Bending	occasionally	Up to 3 hours per day
Hiking	occasionally	Up to 3 hours per day
Walking	5 km/~3 mi	4-5 hours in the morning session and 2-3 hours in the afternoon session (about 16 half-day sessions per expedition)
Carrying	6 kg/13 lb	4-5 hours in the morning session and 2-3 hours in the afternoon session (about 16 half-day sessions per expedition)

Potential Hazards

Potential Hazard	Associated Risks and Precautions
<i>Transportation</i>	As with any field project, the main potential hazard is getting to and from the study site by road. South African road conditions are considered good, particularly in urban areas. However, the roads in the study sites and surrounding areas are dirt/gravel/corrugated and may be very bumpy and either dusty or muddy and slippery depending on weather conditions. Road hazards include fast and reckless drivers, livestock and wildlife, rains, poor or no lighting and banditry. Driving at night is avoided. Traffic moves on the left side of the road. Volunteers will be transported to, from and within the study site by experienced project staff in a 4 x 4 vehicle.
<i>Walking/Hiking/Climbing</i>	Extended periods are spent in the field with the meerkats, and volunteers will be expected to walk with the groups for a minimum of 5 hours every day. Sometimes neighboring groups cross paths, and during these interactions, volunteers will more than likely have to run to keep up with the meerkats. Fence-climbing is also not uncommon, as the meerkats do sometimes move through the game fences and onto the roads. The terrain you will be working in is often hilly and sandy, so volunteers must be fit enough to maintain a brisk pace in these sorts of conditions.

<i>Animals/Plants</i>	A number of different snake species occur here, but the most common venomous species are the Cape cobra and the puff adder, both of which can be fatal and require hospitalization. Scorpions are active at night (although you'll see meerkats eating them by day) so don't walk around after dark without footwear. Four species of scorpion occur here, two of which are dangerous.
<i>Climate/Weather</i>	The Kalahari is hot in the South African summer and so heatstroke and dehydration are potential hazards. It is recommended that volunteers always wear plenty of sunscreen and a hat, and carry and drink lots of water. Conversely, in the South African winter, volunteers should wear suitable clothing so as to protect against severe cold.
<i>Personal security</i>	While most visits to South Africa are trouble-free, crime can be a problem, particularly in cities such as Johannesburg. If you travel into Johannesburg, use sensible precautions, such as the following: <ul style="list-style-type: none"> • Avoid carrying money conspicuously (e.g. in bulging wallets or bum-bags) • Whenever possible, avoid walking alone • Ignore persons who approach to solicit for donations • Avoid wearing jewelry • Avoid wearing "tourist outfits" such as safari shorts, jackets, cameras or binoculars. Choose more conservative clothing, avoiding very short skirts or shorts, tank tops, etc. • Always take a taxi when going out after dark • Select and use ATMs with caution
<i>Diseases</i>	Diseases found in South Africa include malaria, dengue fever, trypanosomiasis, schistosomiasis, hepatitis, typhoid, tuberculosis, rabies and a relatively high incidence level of HIV/AIDS (see Section 11 'Health Information' for inoculation recommendations). Most diseases are prevented with basic safety cautions. Please see the CDC (www.cdc.gov) or WHO (www.who.int) websites for more information. Wild animals may carry infectious diseases (such as tuberculosis and rabies), and meerkats will occasionally bite the researchers who handle them. Volunteers are not required to handle the study animals, but those who would like to help with this aspect of the work might be invited to do so after proper training and under the supervision of project staff. It is strongly recommended that volunteers who wish to handle the study animals are fully inoculated against rabies, tetanus and, if recommended by your physician, tuberculosis.

Medical Conditions of Special Concern

Volunteers should be in good health and physical condition. They should be capable of walking up to 5 km/~3 mi per day over sand dunes covered in thorny scrub, and must be able to run after the meerkats for short periods when necessary.

The degree of isolation associated with the project site along with the climatic conditions mean that volunteers with any potentially incapacitating illness (e.g. diabetes, heart conditions, epilepsy, depression, hemophilia, dizziness, etc.) would not be suited for this project.

Condition	Concern	Precautions
Heart problems	Remote location	Project not suitable
Knee or hip issues	Ability to walk on sand, climb, run	Wear braces, get physician's OK
Diabetes	Remote location	Project not suitable

Hemophilia	Remote location	Project not suitable
Epilepsy	Remote location	Project not suitable

11. HEALTH INFORMATION

Routine Immunizations

All volunteers should make sure they have the following up-to-date immunizations required by your home country: DPT (diphtheria, pertussis, tetanus), polio, MMR (measles, mumps, rubella) and varicella (if you have not already had chicken pox). Other standard immunizations common in some countries may include HIB (haemophilus influenza), pneumococcal, meningococcal, influenza and hepatitis B.

Project Inoculations

The following are recommendations only. Medical decisions are the responsibility of each volunteer. Note that health conditions around the world are constantly changing, so keep informed and consult your physician, a local travel health clinic, the US Center for Disease Control (www.cdc.gov), the World Health Organization (www.who.int) or the resources in Section 15 'Helpful Resources' for the latest health information for travelers.

	Required for Entry	Recommended for Health Reasons
Polio		X
Tetanus		X (up to date)
Typhoid		X
Yellow fever	X - If traveling from countries or region where it is endemic, a Certificate of Vaccination is required	
Hepatitis A		X
Rabies		*X - For volunteer wishing to help with meerkat handling
Measles		X
Tuberculosis		**X - For volunteer wishing to help with meerkat handling
Tetanus		X - For volunteer wishing to help with meerkat handling

Note: Malaria is NOT present at the research site.

* Handling of meerkats is optional for volunteers; however, those who wish to handle the animals should consider immunization against rabies, tuberculosis and tetanus.

** Tuberculosis (TB): The World Health Organization (WHO) estimates that one-third of the world's population is infected with the bacterium (*M.tuberculosis*) that causes tuberculosis (TB). Incidence of tuberculosis is higher in developing countries, particularly in Asia, Africa, the Caribbean and Latin America. In general, approximately 10% of persons infected with *M. tuberculosis* are at risk for developing active TB during their lifetimes. TB is considered highly treatable with medications that are of relatively low toxicity and cost. Volunteers returning from developing countries are encouraged to have a (PPD)-tuberculin skin-test to screen for potential infection.

These recommendations are for this project site only. Please consult your physician for guidance on inoculations if you intend to travel to other parts of the country. Inoculation requirements and suggestions are subject to change. Be sure to consult a public health organization prior to travel to ensure that you have the most current inoculation information.

12. PACKING CONSIDERATIONS

PLEASE BRING YOUR EXPEDITION PACKING CHECKLIST WITH YOU ON YOUR EXPEDITION! IT IS LOCATED AT THE BACK OF THIS BRIEFING.

General Considerations

Do not bring more luggage than you can carry and handle on your own. Space is limited in the vehicle that will transport you to the reserve, so please try to limit yourself to one larger bag and one carry-on bag. We recommend that you pack a carry-on bag with an extra set of field clothing and personal essentials in the event that your luggage is lost and/or takes several days to catch up with you. There is a simple laundry machine and clothesline on site (clothes dry quickly in the sun), so although you should bring clothes to layer, you will not need to bring multiple similar items.

Note: For certain flights, the airline servicing Upington airport has a baggage weight restriction of 20 kg/44 lb per person. It is recommended that you call the airline for further information before you leave.

Weather Considerations

Please take into consideration the weather conditions during your team when packing for your expedition. The Kalahari is an environment of thermal extremes, but is predominantly dry. Moisturizing lotions and lip balm are strongly recommended, especially in the winter months. Volunteers should come prepared for a range of temperatures (including icy winds and swelteringly hot days) while a light rain-jacket should be quite adequate for protection from the rain. Summer runs October–March and winter from April–September. The coldest month is July when nighttime temperatures can fall below 0°C/32°F.

Essential Items

Make sure to bring your Earthwatch Expedition Briefing with you! It includes essential information to which you may need to refer during your expedition, as well as during your journey to and from the project site.

The Kalahari is a land of harsh bright sunshine. Sunglasses are strongly recommended, and sun protection (e.g. hat, sunscreen, long-sleeved shirts and trousers) is essential. For fieldwork in the austral summer months, shorts and t-shirts, or light, long-sleeved shirts, are adequate.

A jersey or warm top is also a good idea as mornings and evenings at the burrow might be a little cool. Volunteers should also pack a rain-jacket as most of our rain falls during the austral summer months. Trousers are a good idea for days spent doing transects, as the bush you will be walking through is rather thorny! Night drives require something a little warmer like a jacket and trousers. In the austral winter, mornings and evenings are very cold. Warm jackets and trousers are a necessity, and a woolly hat and gloves are recommended. However, the days are quite mild so pack t-shirts and light shirts. Layering is always a good idea, but remember that whatever you

take out into the field with you will have to be carried for the next few hours. A sun hat is an absolute must during both summer and winter expeditions.

Good hiking shoes are great as they keep the thorns and sand out. Sandals for casual wear are a good idea – most volunteers can't wait to take their boots off after a field session! Remember that closed-toe shoes have to be worn after dark (for nighttime walks to the bathroom, etc.), so bring another pair if you don't want to have to walk around in your boots at night. There will also be one day when volunteers will go into the local village to visit the school. Previous Earthwatch volunteers have brought casual/non-bush clothes for this day, as well as for evenings after they have returned from the field and showered. There is no need, however, to bring smart attire.

Please see the Expedition Packing Checklist for a complete list of what you will need to take with you. We recommend going through the list with a pen or pencil and marking off each required item right before you leave for your expedition. This list conveniently tears out from the briefing, so you can take it with you when shopping and preparing for your expedition. Make sure to bring the list with you on your expedition so you can check it again before you return home!

13. RECOMMENDED READING

Books

- Dennis, N. and D. Macdonald. 1999. *Meerkats*. New Holland, London.
- Main, M. 1987. *Kalahari: Life's Variety in Dune and Delta*. Southern Book Publishers, Cape Town.

Articles

- Clutton-Brock, T.H., M. Klum. 2002. Meerkats Stand Tall. *National Geographic*.
- Clutton-Brock, T.H., O'Riain, M.J., Brotherton, P.N.M., Gaynor, D. and Kansky, R. 1999. Selfish sentinels in cooperative mammals. *Science* 284:1640-1644.
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- Clutton-Brock, T.H. 2002. Breeding together: kin selection and mutualism in cooperative societies. *Science* 296: 69-72.
- Study site bird list located in the appendix of this Expedition Briefing

Field Guides

- Newman, K. 1998. *Newman's Birds of Southern Africa*. Sixth Edition. Southern Book Publishers, Halfway House.
- Branch, B. 1998. *Field Guide to Snakes and Other Reptiles of Southern Africa*. Struik publishers, Cape Town.

Films

- *Meerkats United* and *Meerkats Divided*
- *Springbok of the Kalahari*

- *Meerkat Manor* (13-part series filmed at the project site in 2004/05 by the BBC for Animal Planet)

Many of these media can be purchased online through popular vendors. See Section 15 'Helpful Resources' for more information.

14. EMERGENCIES IN THE FIELD

The medical/emergency procedure will vary according to the particular emergency situation. There will always be a fully-fueled vehicle available for emergency evacuation to the closest hospital (Kuruman). Where evacuation to a hospital is required, telephone communication will be made immediately with the hospital and a rendezvous will be arranged (either with the ambulance and medical personnel *en route* or at the hospital itself).

At least one member of the field staff will be trained in Emergency Scene Management, CPR, and artificial resuscitation, and will deal with life-threatening situations to the best of his/her ability while attempting to get the victim to professional medical help as soon as possible.

Minor injuries and ailments (such as cuts, small burns, abrasions, etc.) can be treated onsite.

Proximity to Medical Care

Staff certified in safety training	CPR (Cardiopulmonary Resuscitation) and First Aid: Thomas Flower (Project Manager) and Andre Van Wyk (Project Technician)
Nearest hospital and/or clinic	Kuruman Community Hospital Tel: 053 712 0044
Distance	Approximately 3 hours' drive from the reserve

15. HELPFUL RESOURCES

Project-Related and Principal Investigator Websites

- Tim Clutton-Brock's webpage at University of Cambridge: <http://www.zoo.cam.ac.uk/zoostaff/clutton.htm>
- Town of Upington's website: <http://www.upington.co.za/>
- South Africa Online Travel Guide - Upington: <http://www.southafrica-travel.net/kalahari/e6kala01.htm>

Useful Visa Information

- General: <http://www.embassyworld.com>
- For Japanese citizens: http://www.rainbowt.jp/travel/visa_top.html
- For Australian citizens: <http://www.travel.com.au>
- Passport Visa Express: <http://www.passportvisaexpress.com>
- The Visaservice: <http://www.visaservice.co.uk>
- Thames Consular Services Ltd: <http://www.visapassport.com>

Travel Guidebooks and Booksellers

- Lonely Planet travel guidebooks and online travel site: <http://www.lonelyplanet.com>. Their guidebooks can be purchased from their website.

- The Rough Guide travel guidebooks and online travel site: <http://travel.roughguides.com/>
- Amazon: <http://www.amazon.com>
- Barnes and Noble: <http://www.bn.com>
- Airport Codes Worldwide: <http://www.logisticsworld.com/airports.asp>

Travel and Airline Resources

- TravelNotes.org: <http://www.1800-fly.com>
- World Travel Guide: <http://www.worldtravelguide.com>
- Cheap Flights (worldwide): <http://www.travelix.com/> or <http://www.discountair.com/>
- Airport Codes Worldwide: <http://www.logisticsworld.com/airports.asp>
- Third World Traveler – offers many links for useful travel information: http://www.thirdworldtraveler.com/Travel/Travel_Links.html
- STA Travel (US): <http://www.statravel.com>
Tel: +1 800 781-4040
- STA Travel (UK): <http://www.statravel.co.uk>
Tel: +44 (0) 1865 792800
Fax: +44 (0) 1865 792911
Email: manager.oxford@statravel.co.uk
Quote code: EWE01/02
- Wexas International (Europe): <http://www.wexas.com>
Tel: +44 (0) 20 7581 8761
Fax: +44 (0) 20 7581 7679
Email: southern@wexas.com
Quote code: EWE01/02
- UK Foreign Office travel advice: <http://www.fco.gov.uk/travel>
- Travel website for Australia: <http://www.smartraveler.gov.au>
- Common Ground Education and Travel Services (Cuba travel): <http://www.commongroundtravel.com>
Tel: +1 617 661-7653
+ 1 877 661-7653 (toll free)
Fax: +1 617 491-1543
Email: info@commongroundtravel.com
- Uniglobe Travel: <http://www.onetravel.com/Air/AirSearch.aspx?module=Eair&DK=1000010265>
- Frosch International Travel: <http://www.froschtravel.com>
Tel: +1 713 850-1566
+1 800 866-1623 (toll free)
Fax: +1 713 850-0027
- Austin Travel: <http://www.austintravel.com>
[Austin Travel: www.austintravel.com](http://www.austintravel.com)
Tel: 1-800-762-9772
Fax: +1 561 390-6940
Email: vacations@austintravel.com

Country Information

- Country Reports - country information from around the world: <http://www.countryreports.org>
- National Geographic Map Machine: <http://plasma.nationalgeographic.com/mapmachine>
- U.S. State Department: <http://www.state.gov/>

- World Time Server: <http://www.worldtimeserver.com/> (time worldwide with GMT/UTC) or <http://worldbuddy.com>
- Currency Converter: <http://www.xe.com/ucc/>
- Telephone dialing from and to anywhere: <http://kropla.com/dialcode.htm>
- Online Unit Conversions: <http://www.onlineconversion.com>
- Worldwide Weather: <http://www.worldweather.com> or <http://www.wunderground.com>
- ATM Locator:
<http://visa.via.infonow.net/locator/global/jsp/SearchPage.jsp>
<http://www.mastercard.com/atmlocator/index.jsp>
- Heat Index (temperature, dewpoint and relative humidity):
<http://www.weatherimages.org/data/heatindex.html>
- Exhaustive List of Weather Resources:
<http://cirrus.sprl.umich.edu/wxnet/servers.html>

Health Information

- US Travel Clinic Directory: <http://www.astmh.org/scripts/clinindex.asp>
- Travel Health website: <http://www.mdtravelhealth.com> is a resource for healthy travel that covers country-specific risks and diseases, suggested immunizations, health recommendations, and locating a travel clinic near you.
- Center for Disease Control: <http://www.cdc.gov>
Tel: +1 800 311-3435 or +1 888 232-3228
- World Health Organization: <http://www.who.int>
- The Travel Doctor (Australia): <http://www.tmvc.com.au>
Tel: +1 300 658-844 (within AU)
- Disease Outbreaks: <http://www.who.int/csr/don/en/>
- Hospital for Tropical Diseases Healthline (UK)
Tel: 0906 1 337733 (within UK)
(calls are charged at 50p per minute)
- MASTA Travelers' Healthline (UK)
Tel: 0906 8 224100 (within UK)

THE RESEARCH

16. BACKGROUND, OBJECTIVES AND METHODS

Background

The research focuses on the evolutionary causes and ecological consequences of cooperative breeding in mammals and birds. Based at the Kuruman River Reserve in the Northern Cape, South Africa (around 14 km south of the Botswana border), it focuses principally on meerkats, however, research on other cooperative mammals (African ground squirrels, yellow mongooses) and birds (pied babblers, social weavers) is also in progress or planned.

Most current explanations of the evolution of cooperative breeding rely on kin selection (Hamilton 1964) to explain why some animals spend part or all of their lives assisting other individuals instead of breeding themselves (Emlen 1984, Bourke 1997). Kin selection clearly plays an important role in the evolution of many cooperative societies and remains the only satisfactory explanation of the evolution of sterile castes in social insects (Bourke 1997). However, the evidence that it provides a satisfactory general explanation of the evolution of specialized cooperative societies now appears less compelling than it did two decades ago (Cockburn 1998, Queller and Strassmann 1998). Theoretical studies suggest that indirect benefits derived from assisting collateral relatives are likely to be smaller than previous calculations suggest, since any kin selected benefits that helpers receive from relatives should be excluded to avoid double accounting (Creel 1990a, b) and the negative effects of local competition between kin should be incorporated (West *et al.* 2001). In addition, an increasing number of empirical studies show that helpers can be unrelated to the young they are rearing while contributing as much to cooperative activities as close relatives (Dunn *et al.* 1995, Magrath and Whittingham 1997, Cockburn 1998, Clutton-Brock *et al.* 2000, Clutton-Brock *et al.* 2001a). There also appears to be little evidence that species differences in the extent of tolerance or cooperative behavior are related to variation in kinship or that cooperative breeding is confined to groups where coefficients of relatedness are unusually high (Keller 1997, West *et al.* 2001).

In contrast, there is growing evidence that contributing to raising young can have direct benefits to the helper's own fitness. Helpers can gain direct benefits from their contributions to cooperative activities because these raise their subsequent mating success (Cockburn 1998), provide experience of parental care (Komdeur 1996), increase their chance of being allowed to remain in the breeding territory (Gaston 1978) or raise their survival or eventual breeding success by increasing the size of the group in which they live (Kokko *et al.* 2001). The effects of helping on group size are likely to be particularly important for neighboring groups of cooperative breeders that often compete intensely with each other and larger groups that frequently kill, displace or absorb members of smaller groups (Holldobler 1976, Ligon *et al.* 1990, Clutton-Brock *et al.* 1999c). As a result, the breeding success and survival of all group members typically increase with group size in obligate cooperative breeders (Rood 1990, Heinsohn 1992, Queller and Strassmann 1998, Courchamp *et al.* 1999a, Courchamp *et al.* 1999b) though, in facultatively cooperative species, these relationships are less consistent (Brown 1987).

The evidence that cooperative behavior can generate substantial direct benefits to the fitness of helpers raises the possibility that mutualism may play an important role in maintaining cooperative behavior in some societies. This mutualism could account for several puzzling features of obligate cooperative breeders, including the involvement of unrelated helpers in cooperative activities (Cockburn 1998) and the kidnapping and incorporation of juveniles from

neighboring groups (Heinsohn 1991). The possibility that selection may favor individuals that maintain or increase the size of the group in which they live (group augmentation) has been suggested several times in the past (Ligon and Ligon 1978, Rood 1978, Woolfenden and Fitzpatrick 1984) but has attracted limited attention, possibly because it was believed that simple cooperative strategies would be invaded by cheats. However, a new model (Kokko *et al.* 2001) shows that, in small groups, the benefits of increasing group size to all group members can be sufficient to prevent the spread of cheating strategies. The consequences of helping to recipients may also be greater than previous calculations based on estimates of juvenile survival suggest, since helpers may increase the fitness of juveniles after, as well as before, independence (Clutton-Brock *et al.* in press). Conversely, the costs of helping may be lower than supposed, as helpers commonly minimize the risks associated with cooperative activities (Clutton-Brock *et al.* 1999b, Wright *et al.* 2001) and their expenditure on raising young is usually conditional on their age and nutritional status (Clutton-Brock *et al.* 2000, Clutton-Brock *et al.* 2001a). In addition, non-breeding adult subordinates are common in social species where group members do not feed each others' young (e.g. Woodroffe 2000), suggesting that individuals gain direct fitness benefits by remaining in their natal group and that measures of the costs of cooperation should be confined to the marginal costs of helping to group members.

Objectives

The project now needs to extend and re-assess estimates of the costs and benefits of cooperative behavior, to consider the possibility that mutualism, as well as kin selection, may play an important role in maintaining cooperative breeding, and to investigate whether individual contributions to cooperative activities vary with the direct benefits that helpers are likely to gain from cooperation. To understand why helping is maintained in larger groups, despite the potential benefits of defection, one needs to know considerably more about the extent of defection and the mechanisms that constrain this in natural populations (Clutton-Brock and Parker 1995, Heinsohn and Packer 1995).

Understanding the potential benefits and costs of cooperative behavior is not of academic interest alone. This research has already demonstrated the crucial importance of group size in reproductive success and survival in cooperative breeders (Clutton-Brock *et al.* 1999c, Courchamp *et al.* 2000) and emphasized the importance of maintaining group size to the persistence of local populations. By exploring the factors affecting reproductive success and survival, the project's future work should help reveal the factors influencing group size, as well as provide insight into the functions of colonial breeding and an understanding of the impact of ecological factors on colony size and distribution relevant to the management and conservation of colonies.

The project's work on colonial birds focuses on monitoring the distribution of colonies or groups of four main social breeders: white-browed sparrow weavers, social weavers, wattled starlings and pied babblers. The initial aims are to monitor the distribution and size of groups in colonies of all four species and to investigate how both distribution and group size are affected by annual and seasonal changes in rainfall.

Methods

Our work with meerkats will examine the costs and benefits of cooperative behavior in these social carnivores. We already have access to 13 fully habituated groups, and the project will use these to:

- Document the contributions of individual group members to five main cooperative activities (allolactation, babysitting, pup feeding, sentinel duty and burrow renovation)
- Monitor changes in the weight of individuals on a daily basis
- Collect urine and fecal samples for hormonal analysis
- Track group movements and monitor ranging behavior

- Assess the effects of variation in helper/pup ratios on the growth and survival of pups
- Measure the effects of different levels of contributions to cooperative activities on the weight and survival of male and female helpers

Note: Some activities are seasonal, so not all of the above will necessarily be part of the schedule for each Earthwatch team.

All individuals in the study groups are habituated and individually recognizable. Their cooperative behavior is sampled using a range of standard techniques (*ad lib* samples, focal samples and scan samples). Group members have been trained to climb onto top-pan balances and the team monitors changes in their weight by weighing these individuals three times a day (after dawn, midday and before sleeping). Fecal and urine samples are collected for each group. To investigate seasonal and annual variation in colony size in social birds, the team shall locate colonies on the 32 km² reserve (using an existing grid network plus GPS) and monitor the activity and size of each colony.

17. RESULTS AND OPPORTUNITIES

Meerkats provide unique opportunities to investigate the mechanisms maintaining cooperation in mammals. Understanding the ecology of these unusual systems is of central importance in conserving and managing cooperative species. In particular, this work has shown that in contrast to most social animals, breeding success and survival increase with group size in cooperative breeders. Characteristics that depress group size (including disease, predation and resource shortage) are consequently more likely to lead to local extinction in cooperative breeders.

All research addresses fundamental issues of relevance to the understanding of vertebrate populations. The research staff will continue to publish results in a range of specialist and non-specialist journals. Recent publications for research at this site include papers in *Science*, *Proceeding of the Royal Society B*, *Animal Ecology*, *Animal Behaviour* and *National Geographic*.

The research staff works in collaboration with the Mammal Research Institute of the University of Pretoria and the Department of Zoology of the University of Cape Town. In addition, we have links with the biology departments of the University of Stellenbosch and the University of the Western Cape. This research has been approved by the Conservation Authority of the Northern Cape and the results will be shared with all of these bodies.

18. LITERATURE CITED

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EXPEDITION PACKING CHECKLIST

Essential Items

- This Expedition Briefing
- Photocopies of your passport, flight itinerary and credit cards in case the originals are lost or stolen; the copies should be packed separately from the original documents
- Visa and/or passport (if necessary)
- Certification of inoculation (if necessary)

Required Items

Clothing/Footwear for Fieldwork

- Lightweight, quick-drying, long-sleeved shirts and trousers
- Shorts and t-shirts for warmer days
- Set of heavier weight/ warmer clothes if going in winter (April - September)
- Well worn-in and comfortable hiking boots
- Windproof jacket with hood (essential during winter)
- Warm wool or synthetic fleece sweaters or jumpers
- Hats and gloves (winter)
- Thermal underwear (winter)
- Hat with wide brim to protect from sun

Clothing/Footwear for Leisure

- One set of clothing for non-field days and for end of expedition
- Sandals may be preferred in base camp
- Closed-toe shoes for casual wear at night are required to avoid contact with scorpions

Field Supplies

- The project supplies rucksacks/backpacks for daily use (clipboards, GPS, sunscreen, fleece, water, camera, etc.), but volunteers are welcome to bring their own if they prefer
- Drybag or plastic sealable bags (good for protecting equipment such as camera from dust, humidity and water)
- Insect repellent spray
- Water bottles (minimum of two 1-liter bottles)

Bedding and Bathing

Note: Project will supply all bedding and towels

Personal Supplies

- Personal toiletries (we recommend bringing biodegradable soaps and shampoos)
- Antibacterial wipes or lotion (good for “washing” hands while in the field)
- Personal first-aid kit (e.g. anti-diarrhea pills, antibiotics, antiseptic, itch-relief, pain reliever, bandages, blister covers, etc.) and personal medications
- Sunscreen lotion with SPF 30 or higher
- Lip balm, moisturizer, especially in winter

Miscellaneous

- Spending money: Cash is most convenient, but most places in South Africa (other than small towns) will accept credit cards; small towns may not be able to accept traveler’s checks and they may only be useful for volunteers intending to travel around larger South African cities
- Camera, film or memory cards, extra camera battery, plug adapters, battery chargers, etc.
- Binoculars are strongly recommended (8 x 30 or larger are good for wildlife viewing)

Optional Items

- Flashlight/torch or headlamp with extra batteries and extra bulb
- Earplugs
- Field guides (a selection of relevant field guides are available at the study site, but volunteers may wish to bring their own)
- Books, journal and/or other reading material
- Favorite snack foods and drinks (can be purchased in Upington)

Project Wish List

- Maps, photographs or books (especially those showing your country/province/town of origin or pertaining to your local environment): These materials will be useful for volunteers to use in presentations to local children and townsfolk, and with your permission could be donated afterwards to the Van Zylsrus school or public library; the Van Zylsrus community is very isolated and geographically unaware
- 9 V batteries are always useful
- A recent newspaper for the severely out-of-touch researchers