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EXPEDITION REPORT

Expedition dates:
18 January – 13 February 2009
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Report published: January 2011

Status of the Arabian leopard (*Panthera pardus nimr*) in Dhofar, Sultanate of Oman.

First Choice Responsible Tourism Awards	The Independent on Sunday	responsibletravel.com	National Geographic Adventure	Islands	Umwelt-Online-Award	P.M.
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Author:
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Biosphere Expeditions

Khaled al Hikmani
Office of the Advisor for Conservation of the Environment
Diwan of Royal Court, Oman

Matthias Hammer (editor)
Biosphere Expeditions

Abstract

The Arabian Leopard *Panthera pardus nimr* is a flagship species for Oman's mountain habitats. It is classified by IUCN as critically endangered and is listed on Appendix 1 of the convention on International Trade in Endangered Species (CITES) and has disappeared from most of its former range on the Arabian Peninsula. Most of the remaining wild population is confined to the mountains of southern Oman and Yemen. Habitat loss and hunting of both of leopard and prey species including gazelle *Gazella gazella cora*, ibex *Capra nubiana* and tahr *Hemitragus jayakari* over the last 50 years have forced the formerly wide-ranging Arabian leopard into small fragments of remote mountain habitat. The creation of the Jabal Samhan Nature Reserve in Dhofar was a first step towards the Arabian leopard's protection. However, management and conservation efforts require additional input from ecological and social studies to provide the baseline data needed to prevent the threat of extinction in the wild. To this end Biosphere Expeditions has been working in collaboration with The Office of Conservation for the Environment, Diwan of Royal Court since 2006, carrying out Arabian leopard and prey surveys; firstly in Musandam (2006-2007) and subsequently in Dhofar (2008-2010). This report covers the survey work conducted in the January/February periods of 2009 and 2010, in the Wadi Uyun area of Dhofar. It also contains information gathered from the 2009 reconnaissance of Wadi Aydam, located in the Mudayy area, west of Uyun.

Surveys within the 700 km^2 research area, situated to the north and west of Salalah, covered varied topography from wadi floors to mountain ridges and escarpments. Vegetation cover ranged from absent to dense scrub and tree cover. The 2009 expedition identified important habitat biodiversity 'hotspots'. All were linked to natural water sources. The threats to Arabian leopard and wildlife were investigated as were the threats they posed to local farmers. Interviews were carried out in the community to gauge peoples' attitudes to conservation and wildlife. The 2010 expedition built on the 2009 results by surveying new areas and re-surveying and monitoring biodiversity hotspots. New camera trap models were trialed in six locations within Wadi Uyun. Capacity-building and education initiatives were part of both expeditions.

Sign of Arabian leopard was found in 2009 and 2010, but was restricted to a small proportion of the research area. More sign and higher levels of leopard activity were recorded in 2010. Sign of caracal *Caracal caracal*, scarce in 2009, was almost absent in 2010. Arabian wolf *Canis lupus arabis* and striped hyaena *Hyaena hyaena* sign was more abundant in 2010, when both species were captured by camera trap. Although ibex were seen in 2010, sightings frequency suggests a decrease in relative abundance and an increase in poaching levels. There was an increase in gazelle sightings in 2010 and they were more abundant in Wadi Uyun than in 2009, but overall survey results showed a slight decrease in animals recorded. The hyrax *Procavia capensis* population was more abundant in 2010 than 2009.

There was a notable increase in livestock damage and human disturbance in 2010. Evidence of illegal hunting, road-building, development, overgrazing and erosion caused by domestic livestock was increasingly apparent in 2010. Interviews with local people indicated that Arabian leopard numbers are declining and that their range and local distribution has decreased in recent years. Recommendations for further actions to inform decision-makers and enable effective conservation are set out in this report.

ملخص

يمثل النمر العربي رمز من رموز البيئة الجبلية في سلطنة عمان ، حيث أنه مهدد بالانقراَض بشكل خطير حسب الاتحاد الدولي لصون الطبيعة ومدرج أيضا في الملحق الأول من الاتفاقية الدولية سايتس والذي تحظر المتاجرة الدولية بالأنواع المهددة بالانقراَض. انقرض النمر العربي من معظم مناطق انتشاره في شبه الجزيرة العربية حيث تنحصر أعداده الحالية في جبال سلطنة عمان واليمن. يعتبر فقدان الموائل الطبيعية والصيد الجائر للنمر العربي وفرائسه كالغزال والوعل النوبي والطهر العربي في ما يزيد عن 50 سنة من الأسباب التي قلصت تواجد النمر الواسع النطاق سابقا إلى مناطق جبلية منعزلة. إنشاء محمية جبل سمحان الطبيعية في محافظة ظفار كانت أولى الخطوات التي تتخذ في سبيل حماية النمر العربي إلا أن الجهود المبذولة في تدابير الصون بحاجة إضافية لدارسات بيئية واجتماعية لتوفير المعلومات الأولية المطلوبة لمنع دون انقراض النمر من البرية. لهذا قامت بيوسفير أكسبديشنز بالتعاون مع مكتب حفظ البيئة بديوان البلاط السلطاني بالمسوحات الميدانية للنمر العربي وفرائسه منذ عام(2006-2007) في جبال مسندم وفيما بعد في جبال ظفار منذ عام (2008-2010). يبين هذا التقرير أعمال المسح التي قامت بها بيوسفير اكسبديشنز في شهر يناير-فبراير(2009-2010) في وادي عيون بمحافظة ظفار. التقرير يشمل أيضا معلومات لمسح استطلاعي في عام 2009م لوادي عيدم غرب وادي عيون.

تم إجراء هذه المسوحات في المنطقة الواقعة شمال غرب صلالة حيث تبلغ مساحة المنطقة الممسوحة 700كم مربع وهي عبارة عن أودية وتلال جبلية ومنحدرات صخرية تنفرد بغطاء نباتي يتفاوت من معدوم إلى شبه كثيف. قامت الحملة باستقصاء التهديدات التي تواجه النمر والحياة الفطرية بشكل عام مع التحقيق في مخاطر هذه الحيوانات للرعاة في المنطقة. كما أجرت الحملة مقابلات مع السكان المحليين لتقيم وتحديد مواقفهم تجاه المحافظة على الحياة الفطرية

تفيد نتائج الحملة لعام 2009م في التعرف على مناطق بيئية هامة للتنوع الفطري وهذا موصول للموارد المائية الطبيعية في المنطقة. ففي عام 2010م قامت الحملة بمسح مناطق جديدة مع إجراء رصد ومراقبة للمناطق الممسوحة في عام 2009م. تم أيضا تركيب عدد 6 كاميرات فخيه ضمن منطقة وادي عيون. بناء القدرات ومبادرات توعوية كان أيضا جزء من عمل الحملتين.

تبين نتائج الحملة بوجود دلائل للنمر العربي في عام (2009-2010م) ولكن هذه الدلائل كانت في جزءا صغير من منطقة المسح. أكثر دلائل لوجود النمر العربي ونشاطاته سجل في عام 2010م. دلائل لتواجد الوشق كانت شحيحة في عام 2009م بينما غالبا معدومة في عام 2010م. توضح النتائج أيضا بتواجد الذئب والضبع بوفرة في عام 2010م وهذا بسب تسجيل الكاميرات الفخية لهما. على الرغم من مشاهدات الوعل النوبي في عام 2010م نتائج المسح تشير إلى نقص في أعداد الوعول وارتفاع في نسبة الصيد غير الشرعي. الغزال العربي تم مشاهدته في عام 2010م حيث تشير النتائج إلى ارتفاع في نسبة المشاهدة مقارنة مع عام 2009م وأن أعداده أيضا أكثرة وفرة في وداي عيون من نتائج عام 2009م إلا أن النتائج الكلية للمسح توضح بوجود نقص طفيف في أعداد الغزال. الوبر الصخري كان أكثر كثافة في عام 2010م مقارنة مع عام 2009م.

وتفيد النتائج أيضا بزيادة حجم الأضرار التي خلفتها المواشي والإزعاج البشري في عام 2010، حيث الدلائل عن الصيد غير القانوني وإنشاء الطرق والتنمية والرعي الجائر وتأكل التربة بسب المواشي والسكان كان أكثر وضوح في عام 2010م. في حين أشارت المقابلات مع السكان المحليين إلا أن أعداد النمر العربي قد تناقصت خاصة في السنوات الأخيرة. يعرض هذا التقرير في نهايته توصيات للعمل المستقبلي والتدابير الفعالة للحفاظ على النمر العربي.

Contents

Please note: Each expedition report is written as a stand-alone document that can be read without having to refer back to previous reports. As such, much of this and the following sections, which remains valid and relevant, is a repetition from previous reports, copied here to provide the reader with an uninterrupted flow of argument and rationale.

1. Expedition Review

M. Hammer (editor)
Biosphere Expeditions

1.1. Background

Biosphere Expeditions runs wildlife conservation research expeditions to all corners of the Earth. Projects are not tours, photographic safaris or excursions, but genuine research expeditions placing ordinary people with no research experience alongside scientists who are at the forefront of conservation work. Expeditions are open to all and there are no special skills (biological or otherwise) required to join. Expedition team members are people from all walks of life and of all ages, looking for an adventure with a conscience and a sense of purpose. More information about Biosphere Expeditions and its research expeditions can be found at www.biosphere-expeditions.org.

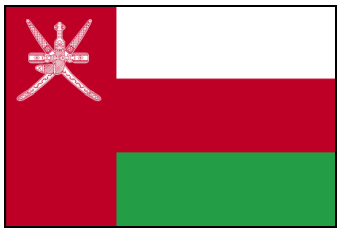
This expedition report deals with expeditions to the Dhofar area in southern Oman that ran from 18 January – 13 February 2009 and 17 January – 13 February 2010. The expedition assisted local scientists from the Office for Conservation of the Environment, Diwan of Royal Court (OCE) in ascertaining the status of the Arabian leopard in parts of the remote and mountainous Dhofar region of Oman. The expedition searched for leopard signs and attempted to camera trap animals in potentially prime leopard habitat, completed a wildlife inventory of the area, strengthened ties with local people and investigated historical records of leopard presence.

The Arabian leopard is a flagship species for Oman's mountain habitats. It once occurred throughout the mountainous regions of Oman, Yemen, Saudi Arabia, the United Arab Emirates, Palestine and Jordan. However, by the 1990s the leopard became locally extinct in most areas of the Arabian Peninsula and if viable populations remain, they are most likely to be found in the high mountains of Oman and Yemen.

The Arabian leopard is the largest surviving cat species of Arabia. Listed as "critically endangered" in the IUCN List of Threatened Species, it is on Appendix 1 of the Convention on International Trade in Endangered Species (CITES), which strictly regulates international trade in listed animals.

In 1997 the OCE began a survey of the Arabian leopard in Jabal Samhan Nature Reserve in Dhofar, where a strong population has been shown to exist. However, the one other area of Oman where the leopard may survive, namely the Musandam peninsula, had not been surveyed until Biosphere Expeditions conducted a study in 2006 and 2007. As the natural prey species in the Musandam region are likely to be at very low numbers, leopards often have to turn to domestic stock, mainly goats, for food. The socio-economic interaction with local people and herders were also investigated during the expedition.

1.2. Research Area



Flag and location of Oman and study site.

An overview of Biosphere Expeditions' research sites, assembly points, base camp and office locations is at Google Maps.

Oman is the third largest country in the Arabian Peninsula, with a population of 2.3 million. It maintained its independency throughout its history except for brief occupations by Persians and the Portuguese. The Dhofar mountains in southern Oman run eastward from the Republic of Yemen to the southernmost eastern tip of Oman. Salalah is the region's biggest town and of commercial importance thanks to its port. The local economy also benefits from fishing and Frankincense harvesting. In areas along the coastline with good irrigation or rainfalls, fruits such as dates, coconut and bananas are produced, and cattle are farmed.

Geology

Oman is located in the Arabian plate, which includes the Arabian Peninsula, the shallow Arabian Gulf and the Zagros mountains of Iran. For most of its history, it has been part of the larger Afro-Arabian continent until 25-30 million years ago when the Red Sea began to open and separate the Arabian and African plate. Presently the plate is moving at a rate of 2 to 3 cm per year away from the African plate.

The mountains of Dhofar in the south and the al Hajar mountains in the north have different origins. Those of Dhofar were uplifted as part of the process of creating the Red Sea and Gulf of Aden, which began about 30 million years ago, whereas the origins of Al Hajar can be traced back 300 million years.

1.3. Dates

The expedition ran over two periods of four weeks divided into two two-week slots, each composed of a team of international research assistants, guides, support personnel and an expedition leader. Expedition slot dates were

18 - 30 January | 1 - 13 February 2009
17 - 29 January | 31 January - 12 February 2010

Winter dates away from the extreme heat of summer were chosen for best weather and working conditions.

1.4. Local Conditions & Support

Expedition base

The expedition base consisted of a Bedu style tent camp (of a Bedu mess tent and more modern one and two person dome tents for sleeping in). An expedition cook complemented the team and vegetarians and other special diets could be catered for. There was very limited electricity at the field base. The circuit was a car battery based 12V DC cigarette lighter plug and socket system.

Field communications

There was an (emergency) satellite telephone at base. Mobile phones did not work in and around camp and around much of the study site. In the field, two-way radios were used for communication between research teams wherever possible. The expedition leader sent an expedition diary to the Biosphere Expeditions HQ every few days (see appendix 4) and this diary appeared on the Biosphere Expeditions website at www.biosphere-expeditions.org/diaries for friends and family to access.

Transport and vehicles

Team members made their own way to the assembly point in Muscat. From there the team boarded a one hour flight to Salalah and then drove about four hours to base in the expedition Land Rovers. From the assembly point onwards and back to the assembly point all transport and vehicles was provided for the expedition team, for expedition support and emergency evacuations. Courtesy of Land Rover Middle East & Africa in Dubai, the expedition had the use of three LR3s and exceptional support from Land Rover Middle East & Africa in Dubai and the local dealers MHD in Muscat and Salalah throughout.

Team members wishing to drive the Land Rovers had to be older than 21, have a full clean driving licence and a new style EU or equivalent credit card sized driving licence document. Off-road driving and safety training was part of the expedition.

Medical support & insurance

The expedition leader was a trained first aider, and the expedition carried a comprehensive medical kit. The standard of medical care in Oman is high and further medical support was available at government health posts in rural areas and a government hospital in Salalah.

All team members were required to carry adequate travel insurance covering emergency medical evacuation and repatriation. Emergency evacuation procedures were in place. There were no serious medical incidents.

1.5. Expedition Scientists

The expedition scientists comprise a team from the Office for Conservation of the Environment based in Muscat. The team is headed by Dr Andrew Spalton and assisted by field assistant Khaled al Hikmani.

Andrew Spalton came to Oman in 1987 to work on the reintroduction of the Arabian oryx. After six years at the project field headquarters in central Oman he left for Aberdeen (Scotland) to complete his PhD on the ecology of the oryx. Returning to Oman in 1995, Andrew took up a new post in Muscat. While continuing to help oversee the oryx project, he undertook new work with the Arabian leopard and Arabian tahr. He set up the Arabian Leopard Survey which collected the first information on the ecology of the highly endangered Arabian leopards. Using camera traps and later satellite collaring, Andrew and his team have mapped the occurrence and range of the Arabian leopard in southern Oman. Andrew now works as Adviser for Conservation of the Environment and oversees a team of scientists and rangers working on the Arabian oryx project, Arabian tahr project and the Arabian Leopard Survey. His other interests in Oman include whale watching, diving, trekking and camping in the interior.

The expedition's field scientist is Tessa McGregor. Tessa was born in Paris and educated in England. She read Biology at King's College, London and specialised in animal behaviour and ecology. Her life-long passion for wildlife and wild places has motivated her personal and professional life. Tessa has worked in remote places, as a wildlife biologist, environmentalist and in the media - TV, radio and journalism (including BBC Natural History Unit, Radio 4, World Service and Discovery). She is an expert on big cat biology and has worked extensively on tigers in Bangladesh and (with Biosphere Expeditions) on snow leopards in the Altai. She loves sharing her passion for the natural world with others and has organised many field trips and wildlife projects. Tessa lives in Scotland and her other interests include riding, diving and photography.

Khaled Mohammed al Hikmani, the expedition's field guide, was born near Jabal Samhan, Dhofar. He joined the Office for Conservation of the Environment in 2007 and is responsible for the field work of the Arabian Leopard Survey. He has also worked on projects throughout Oman and joined Biosphere Expeditions on its expedition in Caprivi, Namibia where his experience with Arabian leopards was very useful for Biosphere Expeditions' African leopard work.

1.6. Expedition Leader

This expedition was led by Ronald Seipold. Ronald graduated from the University of Berlin with a Masters Degree in Business Administration and then spent several years working in different branches of industries leading organisational and IT related projects. He then decided to go for a total change of career & lifestyle and focus on his passion for travelling, wildlife and the outdoors. After a 100 day intensive training course with COLT (Canadian Outdoor Leader Training) he qualified as an outdoor leader, radio operator, sea kayak and canoeing guide, backcountry first-aider, etc.. Ronald then began leading and instructing groups in the outdoors primarily in Scandinavia and Canada as well as working for outdoor camps and lodges. Ronald joined Biosphere Expeditions in 2007. His favourite activities are mountaineering, canoeing and climbing.

1.7. Expedition Team

The expedition team was recruited by Biosphere Expeditions and consisted of a mixture of all ages, nationalities and backgrounds. They were (with countries of residence):

2009

Ursula Borgwardt (Germany), Roger Bunce (UK), Katie Bunting (UK), Robert Burton (UK), Klaus Ender (Germany), Isabelle Fragniere (Switzerland), John Hogan (USA), Ashley Holden (UK), Roberta Lattuada (The Netherlands), Roar Lovviken (Norway), Sarah Low (Australia), Birgit Mandl (Germany), Erin McCloskey (Canada), Susanne Moelter (Germany), Axinja Munkel (Germany), Nicole Pastrik (Germany), Yvonne Raap (Switzerland), Martyn Roberts (UK), Grethe Sand (Norway), Christian Schwenk (Germany), Rasha Skybey (Australia), Toby Whaley (Germany), Susanna Wyatt (UK).

2010

George Benson (USA), Sibylle Gabler (Germany), Frances Greig (Australia), Herbert Groeger (Austria), Patrick Kinsella (Australia), Tenille Petrilli (Australia), Jens Philipp (Germany), Claudius Rajchl (Austria), Ben Rees (UK), Leslie Ruyle (USA), Wolfgang Rzepka (Germany), Tess Sansome (USA), Irmtraud Schumann (UK), Goeran Skogsmo (Sweden), Marion Westphal (Germany), Toby Whaley (Germany), Roxanne Whelan (Oman).

1.8. Expedition Budget

Each team member paid towards expedition costs a contribution of £1260 in 2009 and £1340 in 2010 per person per two week slot. The contribution covered accommodation and meals, supervision and induction, special non-personal equipment, all transport from and to the team assembly point. It did not cover excess luggage charges, travel insurance, personal expenses like telephone bills, souvenirs etc., as well as visa and other travel expenses to and from the assembly point (e.g. international flights). Details on how this contribution was spent are given below.

Income	£
Expedition contributions	34,657
Grants	12,933
Expenditure	
Base camp and food includes all board & lodging, base camp equipment	3,651
Transport includes fuel & oils, taxis, flights to Salalah	4,073
Equipment, hardware & educational materials includes all research & educational materials purchased or produced	4,877
Biosphere Expeditions scientists & staff includes salaries, travel and expenses to Dubai & Oman	14,234
Local staff includes cooks, helpers, guides and other locally staffed services	5,885
Administration includes registration fees, visas, sundries etc	477
Team recruitment Oman as estimated % of PR costs for Biosphere Expeditions	6,994
Income – Expenditure	**7,399**
Total percentage spent directly on project	**84%**

1.9. Acknowledgements

This study was conducted by Biosphere Expeditions which runs wildlife conservation expeditions all over the globe. Without our expedition team members, who are listed above and who provided an expedition contribution and gave up their spare time to work as research assistants, none of this research would have been possible. The support team and staff, also mentioned above, were central to making it all work on the ground. Thank you to all of you and the ones we have not managed to mention by name (you know who you are) for making it all come true.

Biosphere Expeditions would also like to thank Land Rover Middle East & Africa and MHD, local dealers in Muscat and Salalah, for outstanding support in-country in terms of vehicles, support and press conferences, especially from Rob Hales and Marcelle Safar, who all helped well above the call of duty. Thank you also to Shell for their continued and valued support with fuel, logistics and personnel. Further thanks to Motorola, Cotswold Outdoor, Globetrotter Ausrüstung and Gerald Arnhold for their sponsorship. Thank you to Ben Rees and Marcelo Mazzolli for reviewing drafts of this report. For their help and support in-country we thank the Royal Oman Police, the Royal Air Force of Oman, the Office of the Governor and State of Dhofar and Musandam, the Ministry of Environment & Climate Affairs, Hadi al Hikmani and the local people who helped with the survey.

1.10. Further Information & Enquiries

More background information on Biosphere Expeditions in general and on this expedition in particular including pictures, diary excerpts and a copy of this report can be found on the Biosphere Expeditions website www.biosphere-expeditions.org.

Enquires should be addressed to Biosphere Expeditions at the address given below.

2. Arabian Leopard & Prey Survey

Tessa McGregor
Biosphere Expeditions

Khaled al Hikmani
Office of the Adviser for Conservation of the Environment
Diwan of Royal Court, Oman

M. Hammer (editor)
Biosphere Expeditions

2.1. Introduction

Big cats are declining around the world. They need space, good habitat and a sustainable wild prey base. They are indicator species of habitat quality and often referred to as iconic species; charismatic species representative of particular habitats that people can relate to and are interested to conserve. The Arabian leopard *Panthera pardus nimr* is a flagship species for Oman's mountain habitats. It is classified as Critically Endangered and is listed on Appendix 1 of the convention on International Trade in Endangered Species (CITES). It has disappeared from most of its former range in the Arabian Peninsula. The total remaining wild population is estimated at fewer than 200 individuals and is mostly confined to the mountains of southern Oman and Yemen. Habitat loss and hunting of both leopard and prey species over the last 50 years have squeezed the formerly widely ranging Arabian leopard into small fragments of remaining remote mountain habitat (Hammer et al. 2007, Mazzolli 2009, Spalton and Willis 1999).

Since the 1980s the Arabian leopard has been a conservation priority for Oman. The first captive breeding group of Arabian leopards, established at the Breeding Centre for Omani Mammals in Muscat, were caught in Jabal Samhan in 1985, the same year in which the first camera-trap photographs of leopards from the area were obtained. In 1997 the 4,500 km^2 Jabal Samhan Nature Reserve was created; the only protected area for leopard in Arabia. Between 1997 and 2000 the Arabian Leopard Survey recorded 17 individuals using camera-traps (Spalton et al. 2006). Since 2000 an ongoing programme of camera-trapping and radio-collaring of leopards has confirmed the continuing presence of leopards elsewhere in the mountains of Dhofar, from Salalah going west to the border with Yemen (Office of the Adviser for Conservation of the Environment - OACE, unpublished data).

The best remaining habitat for leopard in Oman is found in the Acacia-dominated scrub of the southern escarpment of Jabal Samhan and the semi-desert of the interior and north aspects of Jabal Samhan, where Nubian ibex *Capra nubiana*, Arabian gazelle *Gazella gazella cora* and hyrax *Procavia capensis* populations are still present and where relatively low people/livestock densities have meant that wildlife could survive. The creation of Jabal Samhan Nature Reserve was a first step towards the Arabian leopard's protection, but to ensure effective management and conservation, additional input from ecological and social studies throughout Dhofar is needed if the threat of extinction in the wild is to be averted.

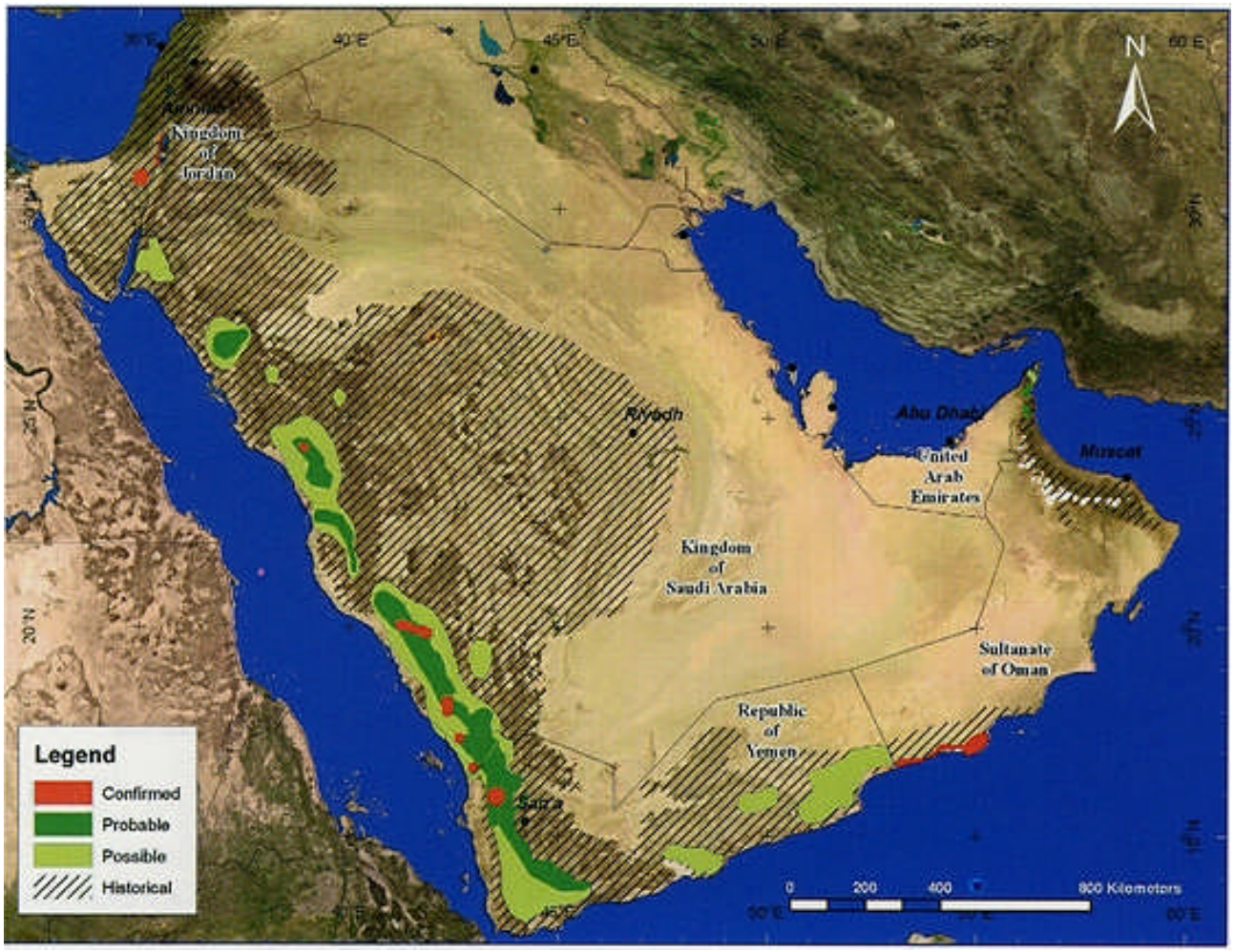


Figure 2.1a. Former and current (since 1990) distribution information for the leopard on the Arabian Peninsula. Confirmed records include confirmed evidence such as dead specimens (with body, skin, etc. available), camera trap pictures and genetic analyses. Probable records include those confirmed by any evidence or by a trained person. Possible records include all non-confirmed or not confirmable records including hearsay and direct observations by untrained persons. From Spalton & Hikmani (2006).

2.2. Methods

Study area

The Uyun research area situated to the north and west of Salalah is shown in Figures 2.2a and 2.2b below. The expedition used the Sultanate of Oman 1:100,000 (WGS 84, UTM Grid) Series K 6611 maps, Edition 3-NSA. The research area is on the UYUN map, Sheet: NE39-12F, used in 2009 and 2010. The map used for surveying the Wadi Aydam area in 2009 is found on Sheet NE 39-12E MUDAYY.

Surveys within the 700 km^2 research area encompassed varied topography and terrain. Elevation ranged from > 600m to ≤ 1200m. Surveys covered wide and narrow wadis, slopes, livestock trails, caves, ledges, mountain ridges, escarpments and plateaus. Vegetation cover ranged from absent to dense scrub and tree-cover. The research area was subdivided into three zones, A, B and C as shown in Figure 2.2b. The Dhofar region bordering the Arabian Sea differs from the rest of Oman due to the influence of the monsoon (khareef). The rains arrive during the summer months creating humidity and more moderate temperatures in the monsoon-affected areas, which includes Zone C.

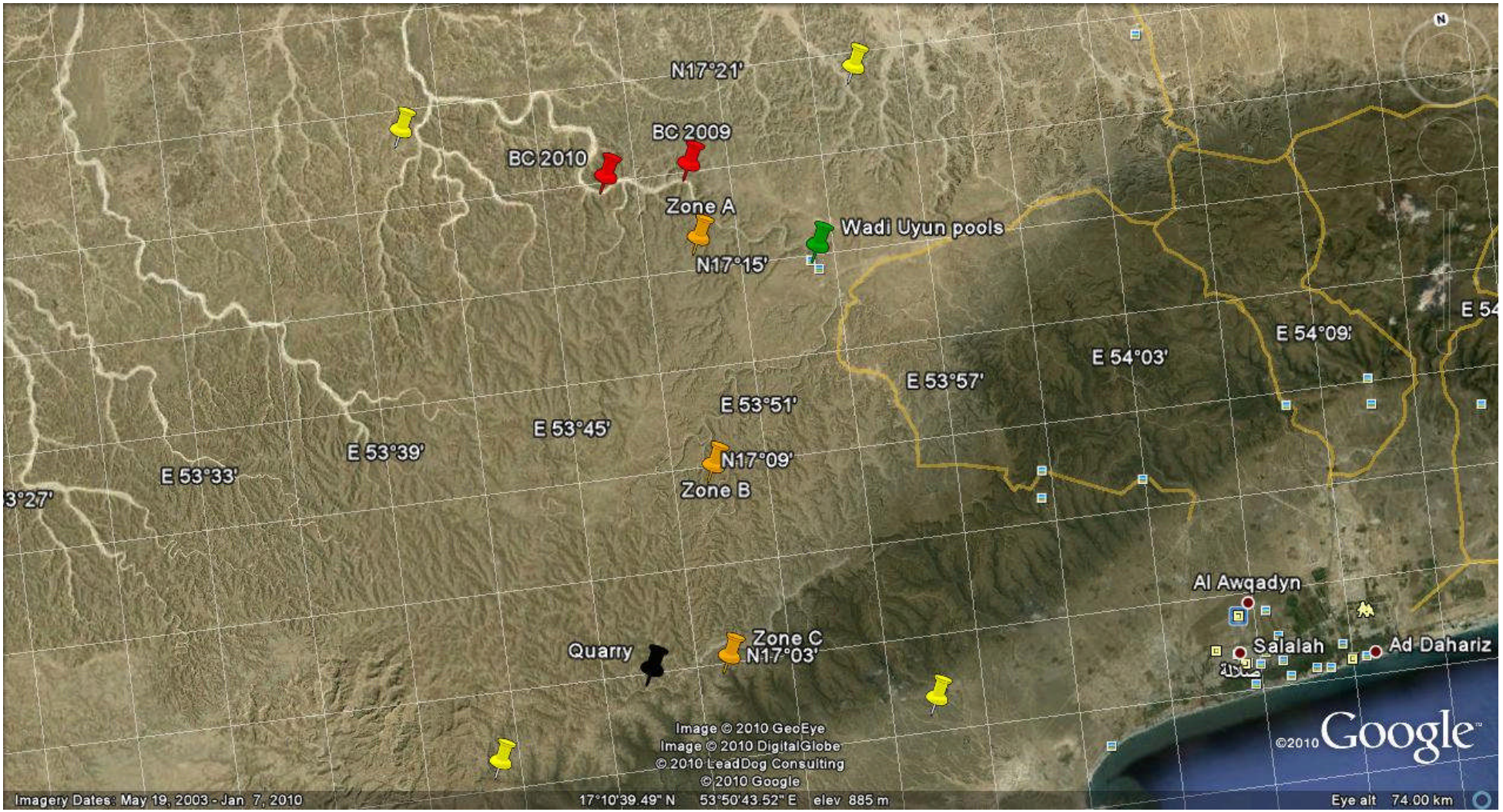


Figure 2.2a. Research area with longitude / latitude grid.

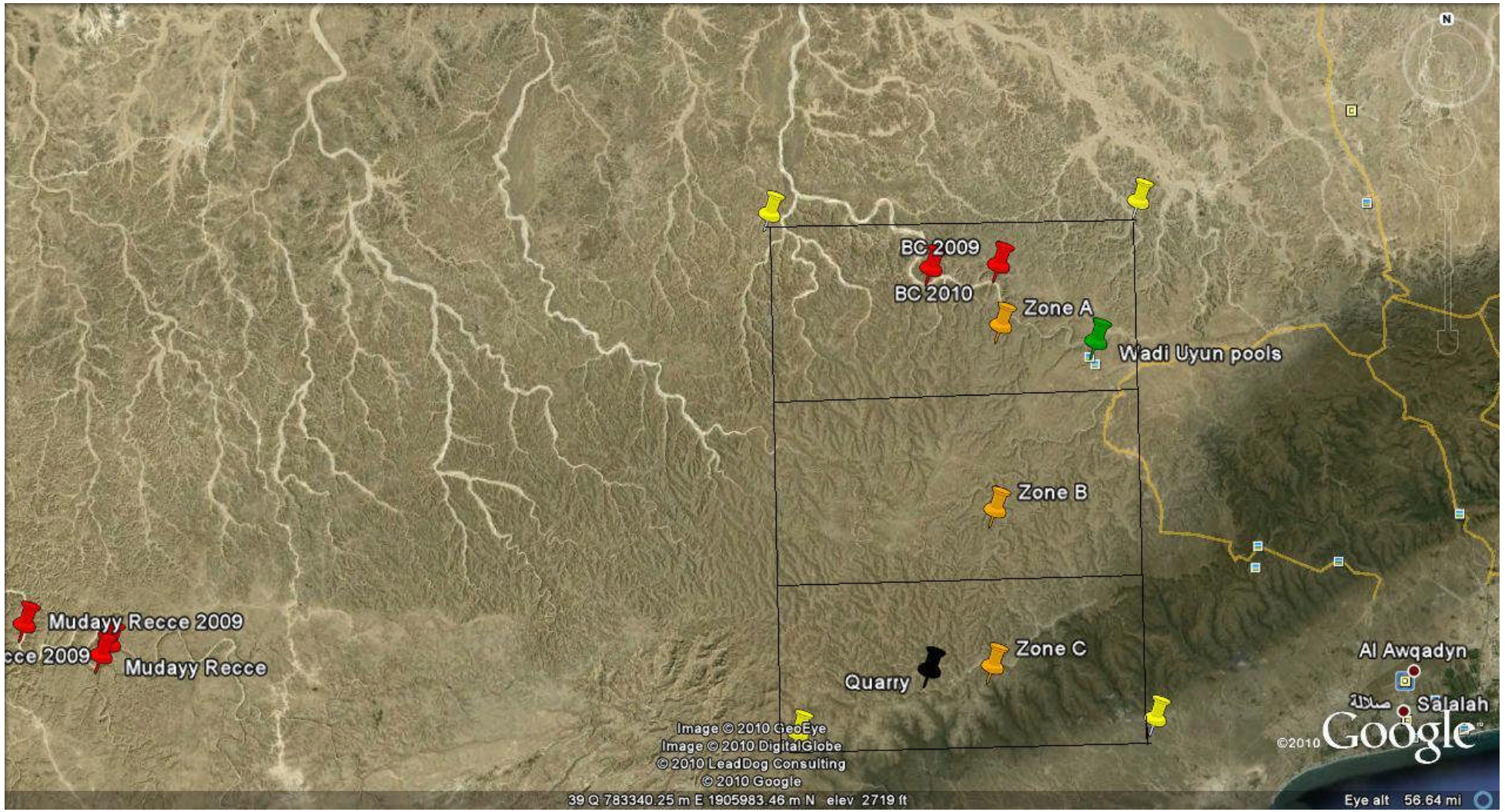


Figure 2.2b. Research area showing 2009 & 2010 survey zones A, B & C of Wadi Uyun. Wadi Aydam in the Mudayy area was surveyed in 2009 (between red pin markers).

Surveys were carried out during the winter period, in January/February 2009 and 2010. The survey area was sub-divided into three zones shown in Fig 2.2b within which survey routes covered as much of the area as time and terrain allowed. Surveys were conducted on foot, but many survey areas were accessed by vehicle (LR3s generously provided by Land Rover). The reconnaissance visit of Wadi Aydam in the Mudayy area in 2009 involved vehicle as well as foot surveys. All surveys were designed to cover the best potential wildlife habitats and maximise chances of finding sign of leopard and prey species. Surveys were conducted by international and Omani field scientists, the expedition leader and international volunteers (team members).

Training

Team members were taught how to use GPS, map and compass. They received training in survey methodology, animal identification, habitat categories and Dhofar vegetation classification types. Volunteers were shown how to use binoculars for observing prey species and shown how to record information on the different datasheets to ensure they had the required GPS, compass and map-reading skills, and understood wildlife/wildlife sign identification, recording and collection protocol for surveys.

Research activities

Team members were trained to carry out leopard surveys, learning where to look for leopard sign and how to identify scats, scapes, urine, scent marks and claw rakes. Training included recording leopard signs and how to use the map and compass to take bearings of wildlife sightings and topographical landmarks. Having a large team to help survey helped cover a substantial geographical area in a relatively short time. It also meant that chances of finding sign of Arabian leopard and other wildlife were maximized by having many people fully engaged in looking for any possible sign.

Collecting Arabian Leopard faecal samples was a high priority as a non-invasive technique. Genetic analysis based on faecal samples are increasingly being used to estimate abundance, identify behavioural parameters and understand population structure in species that are rare, threatened or cryptic (Piggot & Taylor 2003). Team members were shown how to collect and store faecal samples with minimum risk of contamination. However, abundance is a particularly difficult parameter to estimate for low-density, wide-ranging, elusive species, most of which are threatened (Schipper et al. 2008). Scat analysis is also used to determine Arabian Leopard diet, so samples were collected for future analysis.

Team members were taught to survey wild ungulate prey species (Arabian gazelle and Nubian ibex) and hyrax colonies, and how to record topography and vegetation cover. Surveys involved recognising animals and their signs (tracks, faeces, resting/feeding areas). Observations were made using binoculars to count numbers and age/sex of individuals (ungulates only) and to observe behaviour.

Camera-trapping, increasingly used as a survey tool, has been used in Dhofar for over 20 years to record the presence of leopards and identify individuals. The sex and identity of leopards can be ascertained by the presence/absence of testes and each leopard's unique coat pattern.

Effective conservation and management of wildlife populations requires reliable estimates of population density, but the available estimators rely on assumptions that are rarely met in studies of wild populations (Obbard et al. 2010). Large carnivores are difficult to enumerate, because they range widely, occur at low densities, exhibit heterogeneous capture possibilities and are often secretive or elusive (Garshelis 1992; Karanth 1995: Boulanger et al. 2004. This situation has improved through advances in remote identification from photographs or genetic samples (Karanth 1995) that enable researchers to obtain capture-recapture (C-R) data. However, for geographically open populations this can lead to inflated density estimates, because only part of their home range within the research area is available for capture (White 2005). This form of positive bias termed 'edge effect') remains a major obstacle to enumeration of large carnivore populations (Kendal et al. 2008). This is especially problematic for carnivores that are at risk such as the Arabian leopard. To minimise the risk of inflated density estimates both C-R and the Spatially Explicit Capture Recapture (SECR) methodology can be used to analyse a combination of non-invasive techniques to determine Arabian leopard population size, as SECR is used to estimate the density of animal populations from capture-recapture data collected using an array of 'detectors' and uses the locations where each animal is detected to fit a spatial model of the detection process. Hence it obtains estimates of population density unbiased by edge effects and incomplete detection. The high cost of camera traps in the past was a major obstacle to having enough 'detectors'. Lack of skilled manpower added further contraints, but new models of increasingly affordable and easy to use, digital camera traps are contributing to alleviating these problems.

Suitable sites for placing camera traps were identified during the 2009 expedition. Biosphere Expeditions then purchased Cuddeback Digital Scouting Capture Cameras and placed them in the Uyun Research area in 2010. Seven were placed in zone A and one in zone C. Team members were trained to set up, monitor and re-set camera traps, renew batteries and download data from the SD cards. The camera traps were located in wildlife hotpsots close to natural water sources in Wadi Uyun and in the mountainous region of zone C. These sites had been identified in 2009. Only one camera-trap was placed in zone C as it was too far from base camp and too difficult to access except for set-up at the start of the expedition and collection at the end. The remaining cameras were located in areas where they could be monitored during the expedition.

Farming methods were documented with particular emphasis on the impact of domestic livestock on the local environment. Levels of habitat degradation due to overgrazing, tree-barking and browsing by livestock were recorded. Direct human disturbance to the environment, e.g. cutting vegetation for fodder or firewood, litter and poaching activities were also recorded. Researching the impact of domestic livestock species (camels, goats, cattle and feral donkeys) on the habitat was necessary in order to understand the effect this has on Arabian leopard and prey. Accurate data on botanical community composition are desirable for evaluating the effect of livestock on habitat (Fidelibus and MacAller, 1993), but this was not feasible in 2009 or 2010, because there were no trained botanists on the research team. Instead a categorical analysis was performed where livestock damage was divided into easy to identify categories. These ranged from: none (0) where no sign of damage was visible, low (1) where evidence of livestock grazing and/or browsing was found, but either had a negligible impact on vegetation and wildlife and/or affected less than 10% of the survey, medium (2) denoted visible livestock damage (browsing/grazing/erosion) negatively affecting less than 25% of the habitat surveyed.

Finally, the high (3) category was used where there was evidence of livestock damage through browsing/grazing/erosion adversely affecting 40% or more of the survey habitat.

Human disturbance was categorised in a similar way to livestock damage. It was also divided into four categories. These ranged from: none (0) where no sign of human disturbance was visible, low (1) where evidence of human activity was found during a survey, but either had a negligible impact on vegetation and wildlife and/or affected less than 10% of the survey, medium (2) denoted visible signs of damage from fires, litter, livestock pens, encampments, settlements, vehicle tracks, tree cutting or hunting that were having a negative impact on habitat and wildlife surveyed. The last category, high (3) was used where human activities were severely degrading the habitat with serious consequences for habitat and wildlife.

Surveys were conducted in all three zones within the survey area. It was not possible to cover the total area, because of its size and often inaccessible terrain. Priority was given to surveying the best potential wildlife habitat areas. Identifying natural water sources was an important objective. Data were collected on a daily basis. While only a proportion of the research area was surveyed over two years, much of the area was covered during reconnaissance visits to identify the best areas to survey.

Interviewing and involving the local community was an important part of the project. Outreach activities included distributing educational materials, giving presentations and explaining the reasons for the expeditions and survey work. Time was spent with local people in their villages, settlements and surrounding areas in order to gather local knowledge about the area, investigate the level of human/wildlife conflict and learn about local attitudes to wildlife and natural resources. Team members helped by assisting with recording data gathered during interviews. Because of the sensitive nature of this subject which included gathering information about illegal killing of carnivores and of Arabian leopard prey species, as well as environmental degradation caused by livestock, and as interviews were conducted in Arabic or local dialects, team members were not present at some of the interviews.

Local rangers from the Ministry of Environment and Climate Change (MECA) were invited to participate. They joined for week-long periods and received training in wildlife surveying techniques and use of survey equipment. They also received personal outdoor clothing and equipment courtesy of Biosphere Expeditions and Snowgum. In return they acted as guides in some cases and helped to carry out surveys. They were responsible for a high percentage of wild ungulate sightings.

While it was beyond the scope of these expeditions to estimate population and distribution of wildlife other than Arabian leopard and key prey species, all mammals, reptiles and birds encountered directly or indirectly (by their tracks and signs) were identified wherever possible and recorded to create an inventory of vertebrate biodiversity in the research area (see appendices).

2.3. Results

Eighteen Arabian leopard and prey presence/absence surveys were carried out in 2009 and twenty such surveys were conducted in 2010. The numbers of survey participants ranged from 10 to 16 and they were split into smaller teams in order to cover as much as possible of the survey areas. Areas surveyed ranged from ≥ 2 km^2 to ≤ 8 k m^2 and search effort from ≥ 3 hours to ≤ 8 hours. In addition time was spent finding and interviewing local stakeholders and compiling bird and mammal inventories across the research area.

The number of Arabian leopard and prey presence/absence surveys conducted in 2009 and 2010 varied, therefore percentage of surveys in which wildlife sign, livestock damage and human disturbance was found was used to calculate results.

Fig. 2.3a shows the percentage of surveys in which Arabian leopard sign was found. Pugmarks, faeces, scrapes and rock scent sprays were found in 2009 and 2010, but none of the sign encountered in 2009 was fresh. One incidence of vocalisation was reported in zone C in 2009. Although this was not heard by the Biosphere Expeditions team, the leopard call was heard by a local herder in a same survey area where the expedition found leopard pugmarks.

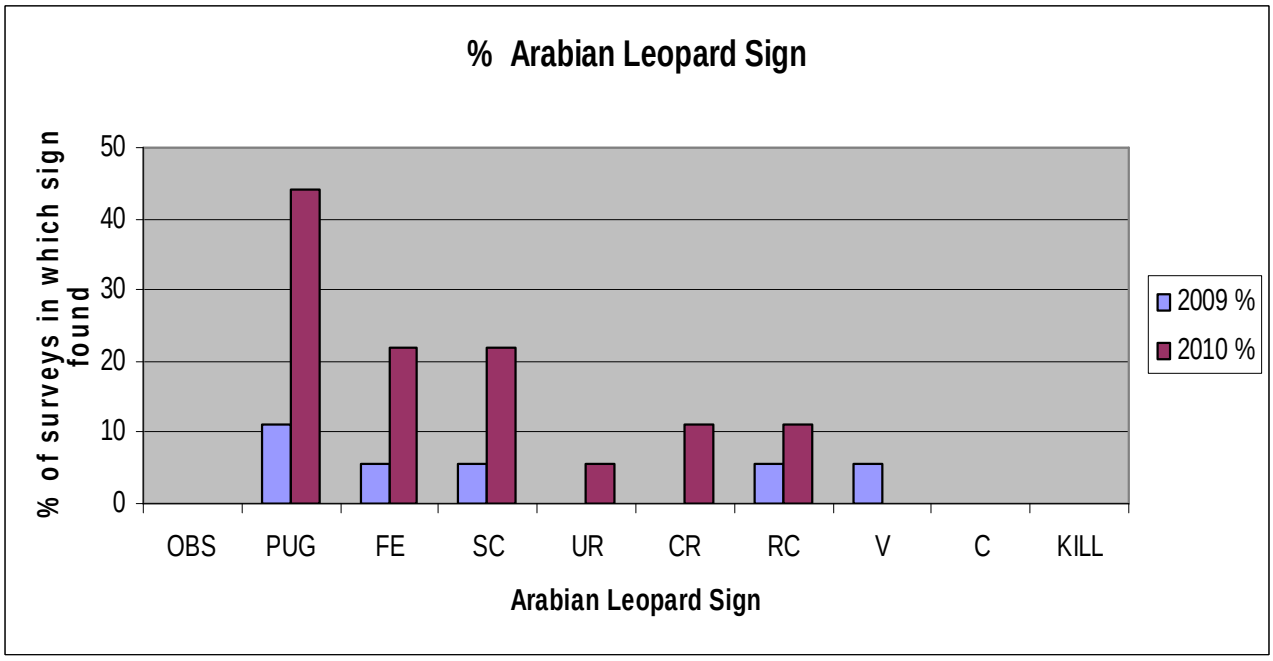


Figure 2.3a. Arabian leopard sign found in 2009 & 2010. OBS = direct observation, PUG = pugmark, FE = faeces, SC = scrape, UR = urination, CR = claw rake, RC = rock scent spray, V = vocalisation, C = leopard remains (skin, bones, etc.), KILL = prey carcass.

In addition to pugmarks, faeces, scrapes and rock-scent spray, sign of urine and claw rakes were also found in 2010. The claw rake marks were first discovered on a tree growing at the mouth of a cave/ledge system in mid-January. The same tree showed evidence of further fresh claw rake marks four weeks later. In contrast to 2009, evidence of fresh pugmarks faeces, scrapes and rock-scent spray and urine were recorded in 2010.

Leopard sign was more abundant in 2010 than in 2009. A high proportion of sign found was fresh, i.e. estimated to be fewer than 48 hours old. Leopard sign was predominantly recorded in zone C, in the mountains and escarpments found to the south of the research area. Leopard sign found in 2009 was restricted to zone C. Over 95% of all leopard sign found in 2010 was in zone C. This included all fresh sign. The remaining leopard sign recorded in 2010 was found in zone A. Leopard was absent from zone B in both 2009 and 2010.

Figures 2.3a and 2.3b below show the results for Nubian ibex and Arabian gazelle sign recorded in the surveys carried out in 2009 and 2010.

No ibex were seen in the research area in 2009, but the most common indirect evidence of Nubian ibex (faeces) was found in 83% of surveys. In 2010, ibex were observed in just over 10% of surveys, but the percentage of surveys in which ibex faeces were found dropped by 33% to 50%. Tracks, faeces and resting depressions were less abundant. Remains (i.e. carcasses, bones, horns, etc.) found in 2009 and 2010 were almost exclusively the results of poaching. This was evident by the type of remains (typically discarded, body parts such as lower legs, clearly severed at the knee, using a knife and horn sheaths/heads). Remains were largely found in the vicinity of waterholes and empty cartidges were also found. There were fewer remains found in 2010 than in 2009, but remains were found over a larger portion of the research area. Ibex sign was found in all zones. Direct observations occurred in zones A and B.

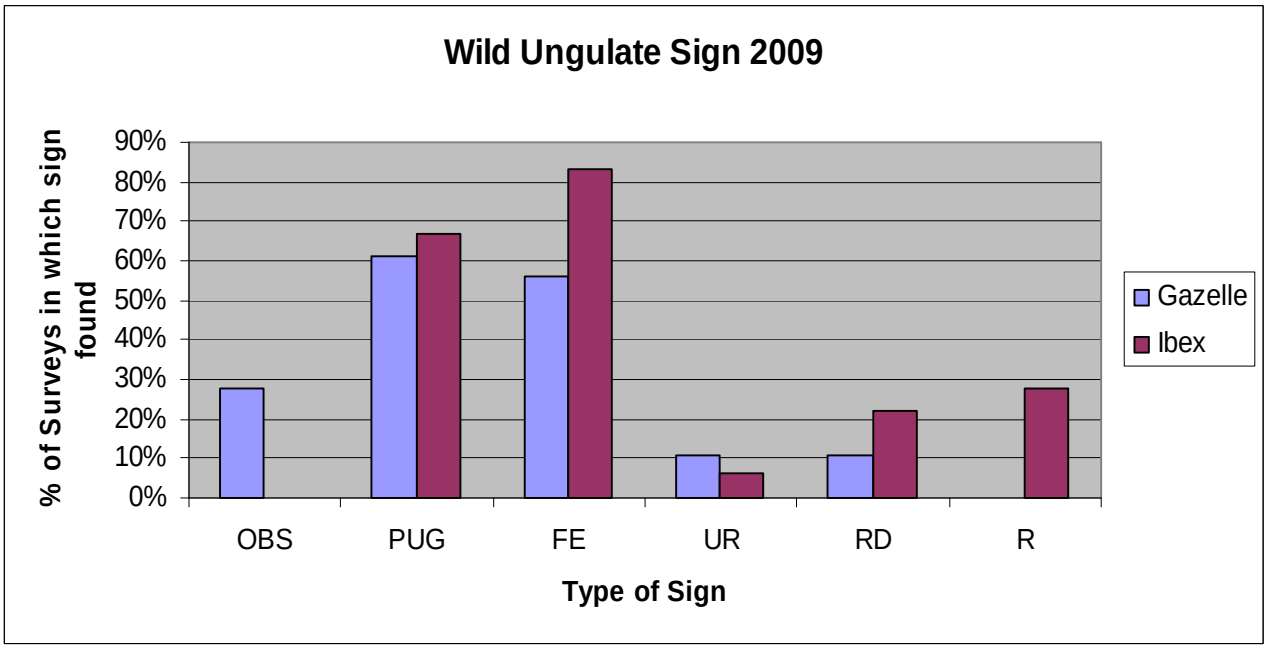


Figure 2.3b. Wild ungulate sign found in 2009 in the Uyun research area. OBS = direct observation, PUG = pugmark, FE = faeces, UR = urination, RD = resting depression, R = remains.

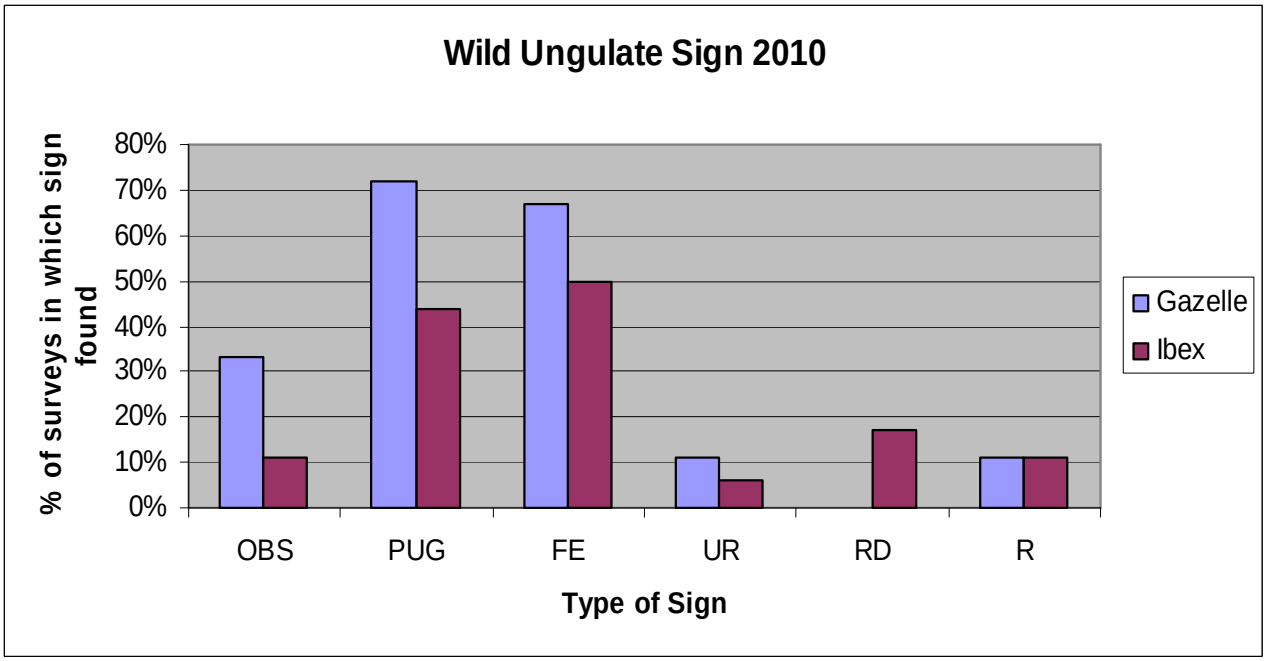


Figure 2.3c. Wild ungulate sign found in 2010 in the Uyun research area. OBS = direct observation, PUG = pugmark, FE = faeces, UR = urination, RD = resting depression, R = remains.

Gazelles were observed in 2009 and in 2010. There was an increase in gazelle sightings in 2010. This occurred in zone A. There was an 11% increase in the percentage of surveys in which the most common gazelle sign (tracks) was found in 2010. This was found in 72% of surveys in 2010 and in 61% of surveys in 2009. The increase in gazelle numbers was visible only in zone A and concentrated in and around Wadi Uyun. Gazelle observations and sign became progressively more scarce from north to south. They were almost absent from zone C. Gazelle remains from poaching were found in 2010.

Table 2.3a. Total number of gazelle sightings during 2009 & 2010 field research period (25 days).

	2009	2010
	Gazelle	
Adult male	2	5
Adult Female	7	25
Calf	0	2
Juvenile	0	2
	Ibex	
Adult male	0	2
Adult Female	0	3
Calf	0	1
Juvenile	0	0

Table 2.3a above shows an increase in gazelle and ibex sightings of both sexes in 2010. Juveniles and calves, as well as adults were observed in 2010. A resident gazelle female and calf and a resident gazelle family group comprised of one male, four females and a juvenile were identified in Wadi Uyun in 2010. The increase in sightings was confined to zone A. The above table also shows no ibex sightings in 2009 and some ibex sightings in 2010. However, very few individuals were observed. The only ibex sighting (of two females) in 2009 occurred outside the Uyun research area, so is not included in the table. Four out of the six ibex seen in 2010 were observed in zone B, the remaining two were seen in zone A, in Wadi Uyun.

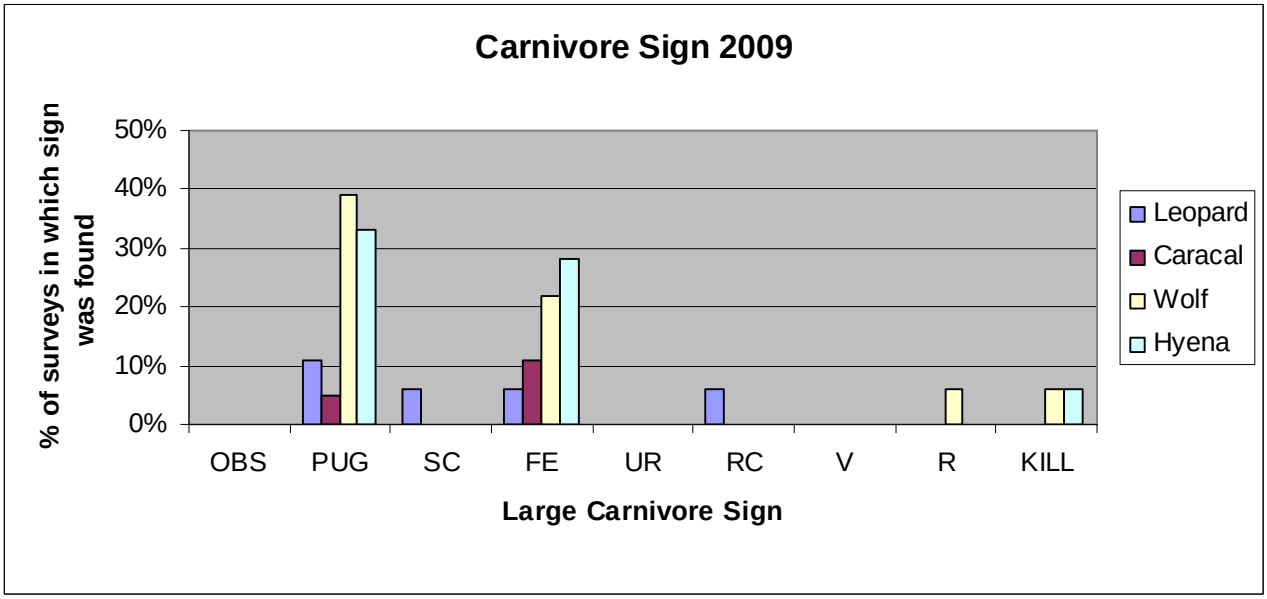


Figure 2.3c. Carnivore sign found in 2009 in the Uyun research area. OBS = direct observation, PUG = pugmark, SC = scrape, FE = faeces, UR = urination, RC = rock scent spray, V = vocalisation, R = remains, KILL = prey carcass.

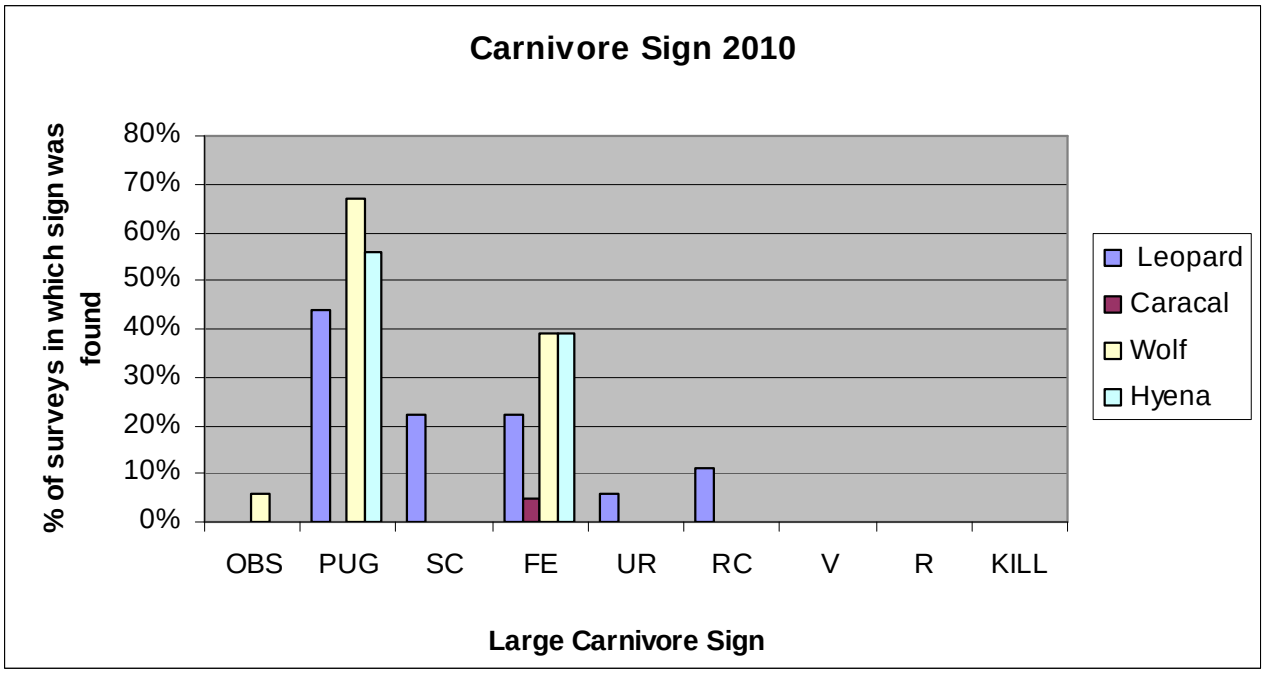


Figure 2.3d. Carnivore sign found in 2010 in the Uyun research area. OBS = direct observation, PUG = pugmark, SC = scrape, FE = faeces, UR = urination, RC = rock scent spray, V = vocalisation, R = remains, KILL = prey carcass.

Figures 2.3d and c show the percentage of surveys in which sign of large carnivore was found in 2009 and 2010. There was an increase in evidence of leopard, wolf and hyaena sign in 2010. By contrast, there was a decrease in caracal sign, which was absent from zone C and the biodiversity hotspots within the survey area.

Despite the high percentage of wolf and hyaena sign recorded in 2010, there was only one large predator observation in total; a wolf sighting in zone C in 2010. Remains of an adult wolf (skull and bones) were found in zone A in 2009, but it was not possible to ascertain whether it had died of natural causes or because of poaching/poisoning. Sign of wolf and hyaena were found in all zones. The increase in wolf and hyaena sign found in 2010 was most evident in zone A, particularly in the vicinity of the biodiversity hotspots. Tracks confirmed the presence of adults and young.

The increase in leopard sign was highly localized within zone C. Tracking showed pugmarks were made by at least three different individuals. Sign of caracal was recorded in zones A & B in 2009. Most of the sign was found in zone B. Possible sign of caracal (faeces) was found in zone B in 2010, but without DNA analysis of the faecal sample, the evidence remains inconclusive.

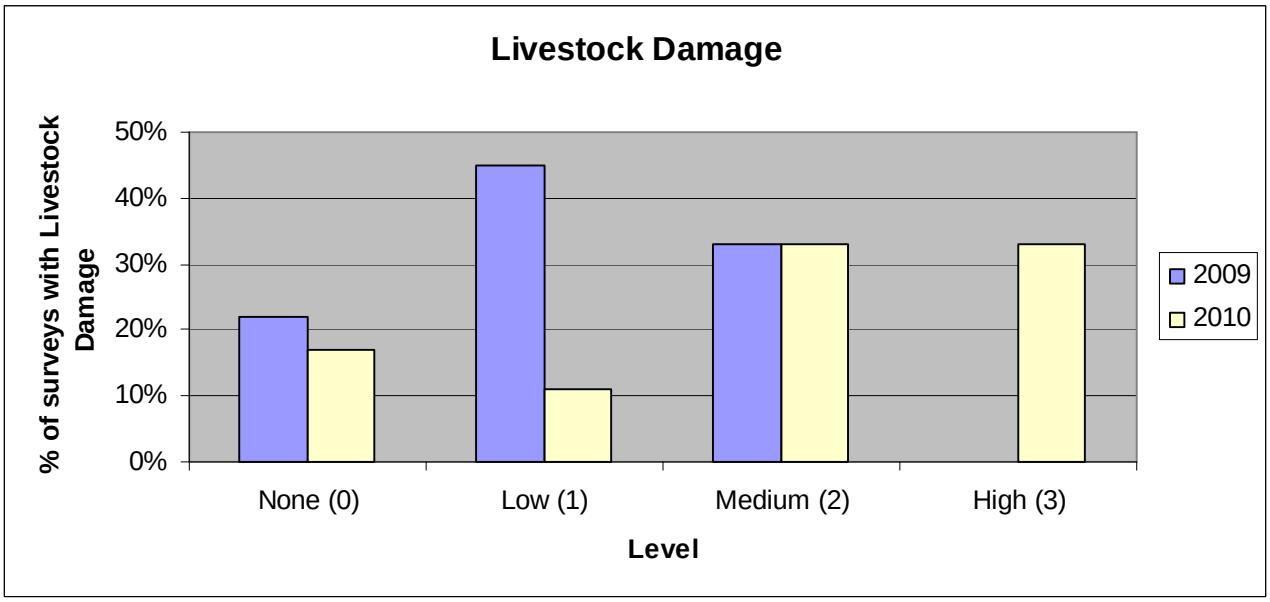


Figure 2.3d. Livestock damage found in 2009/2010 in the Uyun research area. See methods section for an explanation of the damage levels.

Levels of livestock damage recorded during the 2009 and 2010 surveys are summarised in Fig. 2.3d above. Levels of livestock damage observed in 2010 were significantly higher than levels in 2009.

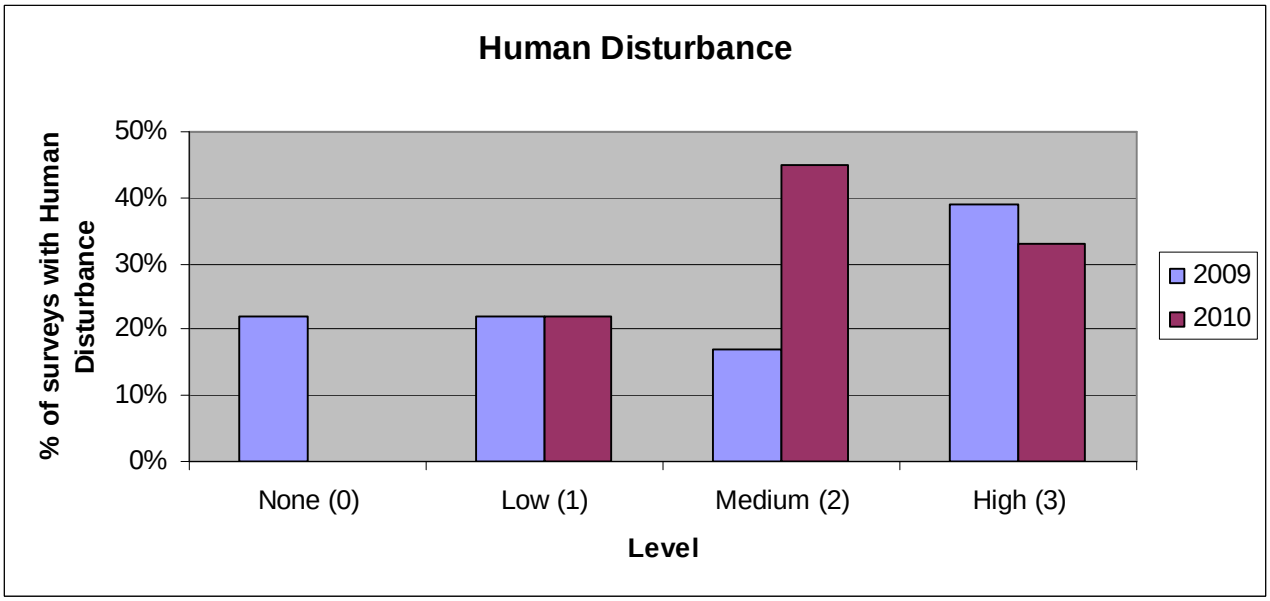


Figure 2.3e. Human disturbance found in 2009/2010 in the Uyun research area. See text below for an explanation of the damage levels.

Levels of human disturbance recorded during the 2009 and 2010 surveys are summarised in Fig. 2.7 above.

There was an increase in the overall level of human disturbance in 2010 and no surveys areas were found to be free of it. The percentage of surveys with low levels of human disturbance were similar in 2009 and 2010. The percentage of surveys in the medium category more than doubled in 2010. There was a slight decrease in percentage of surveys in the high category in 2010.

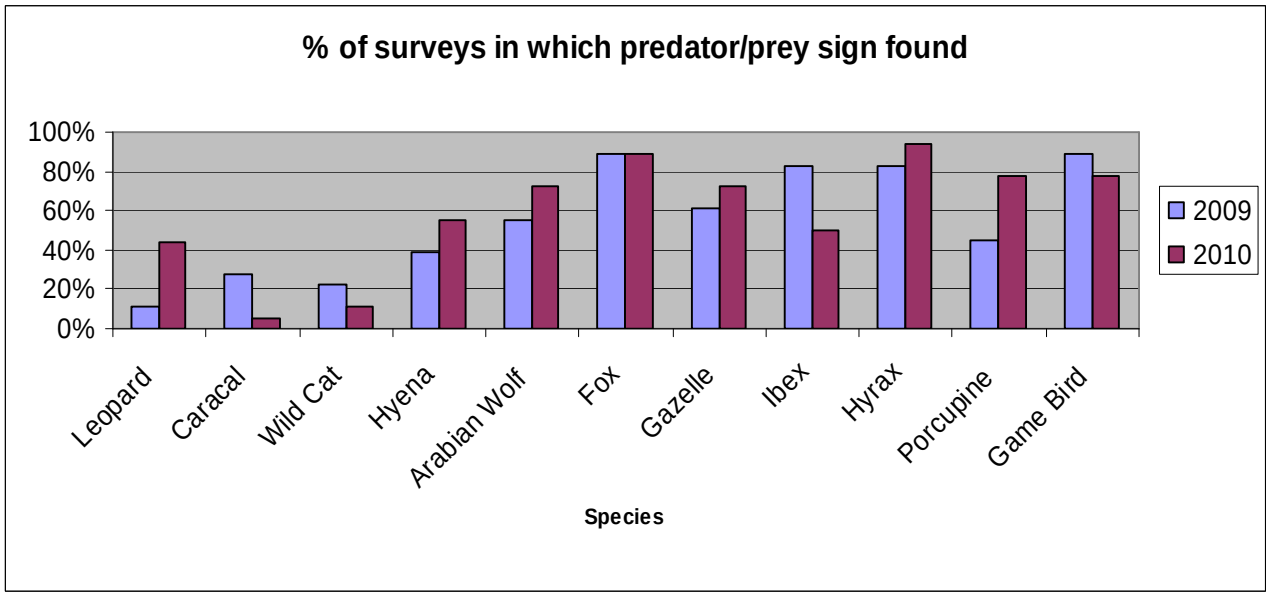


Figure 2.3f. Percentage of predator/prey sign found in 2009/2010 in the Uyun research area.

Fig. 2.3f above shows the percentage of surveys in which carnivore and prey sign were found in 2009 and 2010. There was an increase in percentage of predator sign in 2010, except for caracal and wildcat. Gazelle records increased in 2010, but ibex numbers decreased. More evidence of hyrax and porcupine was fond in 2010. The percentage of game bird decreased slightly in 2010.

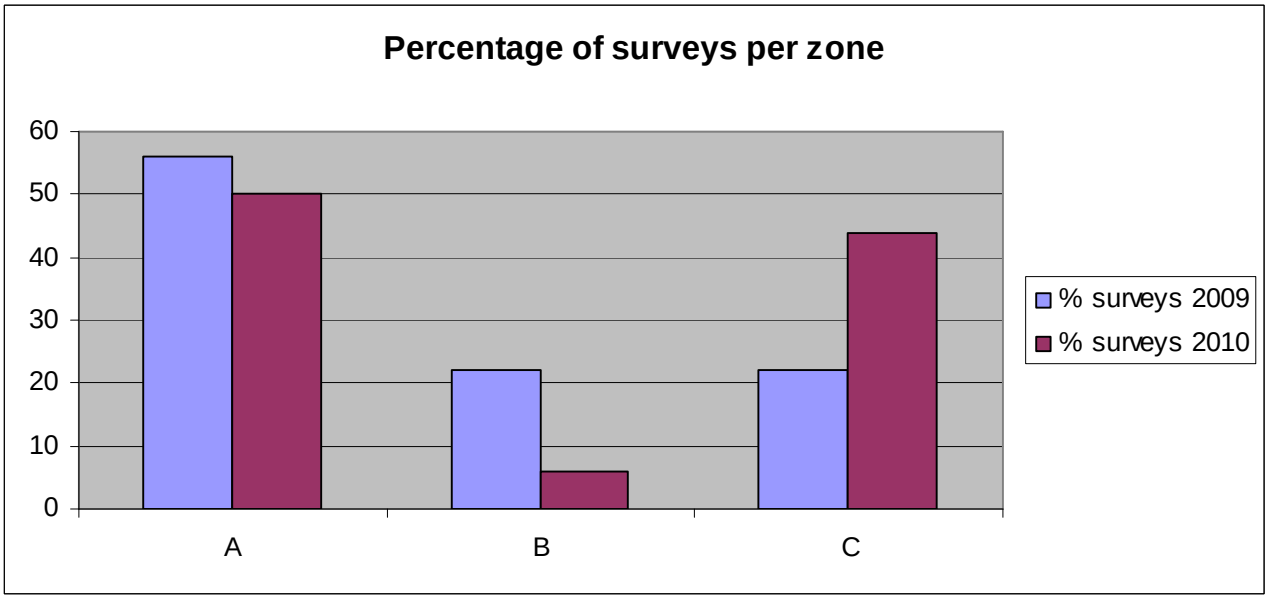


Figure 2.3g. Percentage of predator/prey sign found in 2009/2010 in the Uyun research area.

Zone A covered the north section of the Uyun research area. Wadi Uyun, Wadi Uyun's water sources and accompanying biodiversity hotspots were located in this zone, as was base camp in both 2009 and 2010. Because of the importance of Wadi Uyun for wildlife and its many natural water holes, it was a high survey priority survey in both 2009 and 2010.

Zone B, located in the centre of the research area, was the most arid zone and did not support the same level of biodiversity as zone A or C, although important wildlife habitat areas were identified within zone B. The largest hyrax population and most important ibex observations occurred in this zone in 2010.

Zone C, located in the south of the research area contained the highest elevations and most challenging terrain. It also had the highest percentage of vegetation cover and in some areas the highest levels of livestock damage. In spite of that, it included the most favourable leopard habitat. The higher survey effort carried out in zone C in 2010 may have contributed to the higher percentage of leopard sign found in 2010.

Social Science

Interviews are the most appropriate method of data collection in the social sciences. Interviewing helps participants to articulate their perceptions and feelings (Arksey and Knight 1999). Semi-structured interviews were used for data collection. The interviews were loosely structured around an interview guide containing several key questions, allowing the research agenda to be followed whilst retaining a degree of flexibility for an exploration of meanings. Given some of the contentious issues under investigation such as illegal killing of carnivores due to perceived and actual incidences of predation on domestic livestock and illegal killing of Arabian leopard prey species for recreational hunting, the use of semi-structured interviews helped facilitate the establishment of trust between the interviewer and the participant. This increased the probability of obtaining meaningful and valuable data.

Interviews were conducted in all zones. Interviewees showed similar attitudes towards predators and prey in zones A - C. There was universal hostility towards wolf, hyaena and caracal. Attitudes toward Arabian leopard were neutral to mildly hostile. Attitudes towards gazelle and ibex varied. The most positive attitudes towards ungulate conservation were found amongst interviewees from zone A. Smaller predators such as fox were unpopular. Hyrax, hare and game birds were popular hunting targets. Hunting of these prey animals and of wild ungulates was evident throughout the research area and all zones were affected.

The expedition also compiled bird, reptile and amphibian inventories drawing on the identification skills of team members, local people and scientists. These inventories are listed in the appendices. They are a record of what was seen during the expeditions' time in the field, but were not the focus of its research, so species present in the survey area in 2006 and 2007 may well have gone unrecorded.

Camera trap results

The camera traps tested performed well in daylight. Photographs taken in daylight were of good enough quality to potentially identify individual leopards (by comparing coat pattern) but no leopards were captured on camera trap during the expedition. The camera trap in zone C malfunctioned, taking over 2000 photos, but all these were triggered by the contrast of sunlight and shadow. This problem was experienced to a lesser degree in other cameras placed on ledges in zone A. Photographs taken at night permitted the identification of different species but were not of high enough quality to enable potential individual leopard identification. Battery life was ≤ 3 weeks depending on the number of photos taken. The cameras were easy to set up and viewing and storing images was simple using the dedicated Cuddeback picture viewer. The camera trap test was not designed to produce any quantitative data. Neither Arabian leopard, nor the wild ungulate prey species were photographed, but other large and small carnivores were captured as well as herbivores, birds and domestic livestock (camels). There was evidence of sarcoptic mange in one fox photographed.

Table 2.3b. Summary of Camera Trap results. BC = Base Camp, WU = Wadi Uyun, WU WH = Wadi Uyun waterhole, WH = Wadi Haydayd, JQ = Jabal Al Qara.

Camera	Zone	No of trap days	No of photos	Animals recorded
1 WU BC	A	21	61	Porcupine x 22, Arabian babbler x 3, camel x 2
2 WU HC	A	20	33	Hyrax x 13, mouse (sp?) x 4, bird x 1
3 WU WH (ledge)	A	22	7	Red fox x 1, porcupine x 1, mongoose x 1, hyrax x 1
4 WU WH (waterhole)	A	22	13	Camel x 7
5 WU WH (wadi)	A	22	100	Porcupine x 13, red fox x 4, Arabian partridge x 4, hyaena x 2, mongoose x 3, domestic cat x 2
6 WH (waterhole)	A	14		Porcupine x 4, hyaena x 3, wolf x 1, camel x 1
7 WH (Ledge)	A	14	19	Honey badger x 1
8 J Q (ledge)	C	19	2325	Malfunction

Red fox

Honey badger

Hyrax

Procupine

Striped hyaena

Arabian wolf

Figure 2.3h. Examples of camera trap photos.

2.4. Discussion and Conclusion

Large, continuous habitat is a fundamental requisite for the continued survival of a top predator such as the Arabian leopard. Unfortunately, habitat degradation as a result of a large increase in the number of domestic animals in Dhofar over the last 25 years, together with habitat fragmentation, caused by people and livestock moving into previously remote areas, as well as the rapid pace of development are endangering the long-term viability of the Arabian leopard in Dhofar and beyond (Mazzolli 2009). The resulting small leopard populations are vulnerable to genetic, stochastic and demographic stresses. New roads and quarrying are of particular threat to the long-term viability of Arabian leopard in the research area.

Obtaining reliable data is of great importance for ensuring the effective management and protection of this vulnerable leopard population. Under the best of circumstances, the elusive nature of the Arabian leopard and its challenging habitat makes it a difficult subject for study. The local conditions in Dhofar put added constraints on the methods suitable to study the leopards in this area.

The importance of studying the views of those people who are most directly affected by predators, though they often comprise very small numbers in any society (Ericsson and Heberlein 2003 is essential. Those who live with leopards and are directly affected by them often have very different attitudes to those of the general population. Gaining a comprehensive understanding of the attitudes of the interest groups likely to be most affected by Arabian leopard in Dhofar is crucial. Capacity building is defined as the "process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need to survive, adapt, and thrive in the fast-changing world" (Philbin 1996). Building these skills is necessary to provide the resources needed to conserve the Arabian leopard and other wildlife and involve local communities in conservation in Dhofar.

Bold steps need to be taken if we are to conserve Oman’s and perhaps the region’s last wild Arabian leopard population. Undoubtedly the most important of these is to urgently safeguard the leopards and associated biodiversity with innovative measures that bring real benefits to the local people (Spalton et al. 2006a & 2006b). These innovative measures need to be introduced across Dhofar if the Arabian leopard is to survive in the wild.

Recommendations for further action (during expeditions and by other parties)

- Further expedition work and surveys.
- A long-term camera-trapping programme in the survey area.
- On-going training of local rangers and training in wildlife survey and monitoring methodology - to include collection and storage of possible leopard faeces for subsequent DNA analysis.
- Creating a forum involving local people, relevant government departments and tour operators to raise environmental awareness and address any conservation problems or human/wildlife conflict incidents.

- Livestock care and education programme to improve livestock management and encourage a reduction in livestock numbers. Excluding domestic livestock from most favourable habitats in the long term.
- Sharing data and furthering local participation and educational opportunities.
- Creating a database to input information from local people, students, visiting scientists and tourists.
- A botanical survey to assess the impact of degradation caused by livestock.
- A census of livestock in the study area.

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Appendix 1. Mammal inventory generated by the expedition.

Common Name	Latin name	Sighting 2009	Sighting 2010	Sign 2009	Sign 2010	Camera trap photo 2010
Arabian leopard	*Panthera pardus nimr*			x	x	
Caracal	*Caracal caracal*			x	x	
Gordon's wildcat	*Felis silvestris gordoni*			x	x	
Striped hyaena	*Hyaena hynaea*			x	x	x
Arabian wold	*Canis lupus arabs*		x	x	x	x
Arabian red fox	*Vulpes vulpes arabica*			x	x	x
Blanford's fox	*Vulpes cana*			x	x	x
Honey badger	*Mellivora capensis*			x	x	x
Small spotted genet	*Genetta genetta*			x		
White-tailed mongoose	*Ichneumia albicauda*			x	x	x
Arabian gazelle	*Gazelle gazella cora*	x	x	x	x	
Nubian ibex	*Capra nubiana*		x	x	x	
Rock hyrax	*Procavia capensis*	x	x	x	x	x
Cape hare	*Lepus capensis*		x	x	x	
Indian crested porcupine	*Hystrix indica*	x	x	x	x	x
Ethiopian hedgehog	*Paraechinus aethiopicus*			x	x	
Brandt's hedgehog	*Paraechinus hypomelas*	x	x	x	x	
Wagner's gerbil	*Gerbillus dasyrus*			x	x	x?
Sundevall's jird	*Meriones crassus*			x	x	
Lesser jerboa	*Jaculus jaculus*			x	x	
Egyptian spiny mouse	*Aconys cahirinus*		?			
Kuhl's pipistrelle	*Pipistrellus kuhlii*	x	x		x	

Appendix 2. Bird inventory generated by the expedition.

Common name	Latin name	2009	2010	Comments
Egyptian vulture	*Neophron percnopterus*	x	x	
Long-legged buzzard	*Buteo rufinus*	x		
Steppe eagle	*Aquila nipalensis*		x	More common & seen in larger goups in 2010. One attempted gazelle predation observed 2010 (zone A)
Bonelli's eagle	*Aquila fasciatus*		x	
Greater spotted eagle	*Aquila Clanga*	x		
Verreaux's eagle	*Aquila verreauxii*	x	x	3 breeding pairs (in zones A & C) seen in 2009 but no breeding pairs seen in 2010
Imperial eagle	*Aquila heliaca*	x		
Saker falcon	*Falco cherrug*		x	1 breeding pr (zone C)
Lesser kestrel	*Falco naumanni*		x	
Kestrel	*Falco tinnunculus*	x	x	
Spotted eagle owl	*Bubo africanus*	x	x	calling at night
Afican scops owl	*Otus senegalensis*	x		calling at night
Hume’s tawny owl	*Strix butleri*	x	x	calling at night
Rose-coloured starling	*Sturnus roseus*		x	1 observation (zone C)
Arabian babbler	*Turdoides squamiceps*	x	x	abundant
Trsitam's grackle	*Onychognathus tristramii*	x	x	abundant in Wadi Uyoon
Fan-tailedrraven	*Corvus rrhipidurus*	x	x	breeding pairs (zone A)
House crow	*Corvus ruficollis*	x		
Arabian partridge	*Alectoris melancocephala*	x	x	Observations + sign found in all zones - coveys observed in zones A & B
Sand partridge	*Ammoperdix heyi*	x	x	Observed in zones A & B
Lichenstein’s sandgrouse	*Pterocles lichtensteinii*	x	x	Observations + sign found in zones A & B
Chestnut-bellied sandgrouse	*Pterocles exustus*		x	
Cream-coloured courser	*Cursorius cursor*		x	1 individual seen (zone A)
Isabelline wheatear	*Oenanthe isabellina*	x	x	abundant
Northern wheatear	*Oenanthe oenanthe*		?	
Arabian wheatear	*Oenanthe lugentoides*	x	x	
Desert wheatear	*Oenanthe deserti*	x	x	abundant
Rock thrush	*Monticola saxatilis*	x		

Common name	Latin name	2009	2010	Comments
Blue rock thrush	*Monticola solitaris*	x		
African rock bunting	*Emberiza tahapisi*			common
House bunting	*Emberiza striolata*	x	x	1 sighing (zone C)
Bruce's green pigeon	*Treron waalia*		x	1 sighing (zone C)
Laughing dove	*Steptopelia senegalensis*	x	x	
Rock dove	*Columba livia*	x	x	common
Shining sunbird	*Nectarinia habessinica*	x	x	
Palestine sunbird	*Nectarinia osea*	x	x	
European roller	*Coracias garrulus*	x	x	
Little green bee-eater	*Meropos orientalis*	x	x	common
Common swift	*Apus apus*	x	x	
Dhofar swift	*Apus sp*	x	x	
Barn swallow	*Hirundia rustica*	x	x	
Red-rumped swallow	*Hirundo daurica*	x		
African rock martin	*Ptyonoprogne fuligula*	x	x	abundant
Crested lark	*Galerida cristata*	x	x	abundant
Desert lark	*Galerida deserti*	x	x	
Tawny pipit	*Anthus campestris*	x	x	common
Long-billed pipit	*Anthu similis*	x	x	common
Richard's pipit	*Anthus richardi*	x	x	common
Southern grey shrike	*Lanius meridionalis*	x	x	
Masked shrike	*Lanius (m.) pallidirostris*		x	
Arabian babbler	*Lanius nubicus*	x	x	abundant 2010
Desert lesser whitethroat	*Sylvia curruca minula*	x	x	
Black redstart	*Phoenicurus erythronotus*	x	x	
Desert warbler	*Ammomanes deserti*			
Scrub warbler	*Scotocerca inquieta*	x	x	
Arabian warbler	*Sylvia nana*	x	x	
Yellow wagtail	*Motacilla citreola*	x	x	

Common name	Latin name	2009	2010	Comments
Grey wagtail	*Motacilla cinerea*	x	x	
Graceful prinia	*Prinia gracilis*	x	x	
Yellow-vented bulbul	*Pycnonotus xanthopygos*	x	x	common
Ring-necked paraqueet	*Psittacula krameri*	x	x	
Stonechat	*Saxicola torqauta*	x	x	
Grey heron	*Ardea cinerea*		x	dead bird found in zone A
Grey-headed kingfisher	*Halcyon leucocephala*		x	
Eurasian coot	*Fulica atra*	x	x	
Gadwall	*Anas strepera*		x	

Appendix 3. Reptile & amphibian inventory generated by the expedition.

Common name	Latin name	2009	2010
Jayakar's Oman lizard	*Omanosaura jayakari*	x	x
Blue-tailed Oman lizard	*Lacerta cyanura*	x	x
Bar-tailed semaphore gecko	*Pristurus celerrimus*	?	x
Spotted toad-headed agama	*Phrynocephalus maculatus*	?	x
Wadi racer	*Platyceps rhodorachis*	x	x
Dhofar toad	*Bufo dhofarensis*	x	
Snake sp?		x	x

Appendix 4: Interview datasheet

GUIDELINES FOR RECORDING INTERVIEWS
OMAN

Objectives of interviews

To learn from local community on the main following topics:

1. Where leopards are present now, and where they were present in the past (possible change in distribution);
2. Attacks of leopard to livestock (goats, camels, etc) now and in the past;
3. Where leopard are most often seen now and where there are more attacks to livestock – If leopards have attacked recently you can plan to visit this location;

Guidelines for Team members

You will be visiting local people to find out about their attitudes to and information on Arabian leopards and other wildlife. These interviews will be conducted in Arabic and will be discussed with you. Give time to the Arabic interviewer to get acquainted and introduce the subject to the interviewee. He should soon get you updated on the conversation, as he has been briefed to do. In practice, role of the team member is to make sure that all topics on this sheet are covered and all questions asked as far as possible. In a broader sense, this component of the project would not be in execution without your presence.

1. Be relaxed, friendly, chatty.
2. Take pictures only after asking for permission and then only a few.
3. Keep the datasheet out of sight as much as possible.
4. You can glance at the datasheet or record the questions in your notebook beforehand to make sure they are all covered.
5. Immediately after the interview and out of sight of the interviewee, discuss the datasheet and record the answers, using judgment.
6. Discuss the datasheet in the evening with scientific staff as part of filling in datasheet activity

Guidelines for the Ranger and OCE staff

It is recommended that you introduce yourself and the team members appropriately. This procedure is to avoid the community to consider your as guide and the group as tourists, which is not true. Make sure the local guide, if present, also understand that the **team members are research volunteers working in cooperation with the Diwan of Royal Court and Ministry of Environment & Climate Affairs**, in the Leopard Survey Project. Introduce yourself as Ranger of the Ministry of Environment or an officer of the OACE, as appropriate. You should avoid such sentences as '<u>they</u> want to know about …', the best way to communicate is to say '<u>WE</u> are interested to know about the leopard, as we are in the condition as researcher for the Leopard Survey of the OACE…'. Failure to do so may compromise the interview, as the community will perceive the Biosphere Expedition's team as foreign tourists and may ask for rewards.

Guidelines for the local guide

The Diwan of Royal Court, the Ministry of Environment & Climate Affairs, and Biosphere Expeditions are interested in the leopard because it is disappearing fast. If we do not help protect it, the desert border and mountains will be emptied, there will be no more leopards in the wild. By helping the leopard, you'll be helping your community.

You are very important for this research because people from your community will trust you information that would not to visitors. We need to know as much as we can about the presence of the leopard in the past and where it is know to live now. If the leopard is causing damage to livestock (goats, camels) we need to know to help the leopard and the herders.

DATASHEET: RECORDING INTERVIEWS
OMAN

INTERVIEW CONDUCTED BY: **DATE OF THE INTERVIEW:**

PERSONAL INFORMATION ABOUT THE INTERVIEWEE

Sex:

Age:

Place of residence (name of community):

Place of birth (region):

Occupation:

If you are a livestock owner/raiser, what kind of animals do you have?
Camels Goats Cows Horses Other

INFORMATION ABOUT ARABIAN LEOPARDS AND OTHER WILDLIFE

Are there leopards near this area? If there are, when did you have a last evidence?
□ More than 10 year ago □ Between 5 and 10 years ago □ Less than 5 years ago

Where did you find evidence of the leopard (Wadi, Region?) _____

If you have a herd, where do you leave it (Wadi, Region?) _____
(You should insert a general coordinate after the interview) Coordinates: _____

If you have a herd, there are leopards near it? Yes _____ No _____

Livestock losses to <u>leopards</u> (fill number of animals that have been taken)

	Loss this year	Loss last year	Total herd size	Number of herders involved (single herd or multiple herd)	Unit price in OMR
Camel					
Goat					
Cattle					

Livestock losses to <u>other animals</u> (hyenas, wolves, dogs)

	Loss this year	Loss last year	Total herd size	Number of herders involved (single herd or multiple herd)	Unit price in OMR
Camel					
Goat					
Cattle					

DATASHEET: RECORDING INTERVIEWS
OMAN

Livestock losses to <u>other causes</u> (disease, fall from cliff, snake bite, theft, drought)

	Loss this year	Loss last year	Total herd size	Number of herders involved (single herd or multiple herd)	Unit price in OMR
Camel					
Goat					
Cattle					

YOUR OPINION ON THE LEOPARD

Which of the following statements best describes your feelings towards Arabian leopards?

Strongly dislike Dislike Indifferent Like Strongly like

The presence of Arabian leopards for you is
A good thing A bad thing You are indifferent You are scared

If Arabian leopards attracted more tourists to the region, this would be

A good thing A bad thing You are indifferent

Are Arabian leopards protected in Oman? Yes ____ No _____

	Strongly disagree	Dis-agree	Neutral	Agree	Strongly agree
Arabian leopards have a considerable impact on large game (gazelle, ibex, etc)	1	2	3	4	5
Arabian leopards have a considerable impact on small game (hyrax, hedgehogs, etc)	1	2	3	4	5
Arabian leopard attack humans	1	2	3	4	5
In regions where Arabian leopards live in close proximity to livestock, they feed primarily on domestic animals	1	2	3	4	5
We already have enough Arabian leopards in the region	1	2	3	4	5

Comments (record any other useful/interesting information here)

Appendix 5: Expedition leader diaries by Ronald Seipold

2009

12 January

I hope you have all had a fantastic start into the New Year. The next highlight of this year is coming up soon…our expedition to Oman.

Tessa McGregor, your scientist, Erin McCloskey from the Biosphere Expeditions North America office and I, Ronald Seipold, your expedition leader, started preparations some days ago in Europe and then flew to Muscat. We have packed up all the equipment, received our cars (three shiny Land Rover Discovery courtesy of their makers), held a press conference at Land Rover, checked your flights and talked to the Adviser of Conservation of the Diwan of Royal Court (Omani government). Yesterday we arrived in Salalah and met Khalid (Mohammed Al Daan Al Hakmani) who will be our chief field guide – Insha'Allah.

"Insha'Allah", by the way, is a phrase you are about to become very familiar with… It translates roughly as... 'If Allah wills it' and is a marvelously useful term of complete fatalism and one which has no direct English equivalent. The nearest thing would probably be '...but on the other hand I might get hit by a number 73 bus tomorrow' - uttered in tones of sodden dejection by a clinical depressive with a strong Solihull accent.

Tomorrow (Insha'Allah) I will have an appointment with our cook to prepare at least some basic food menus for you ☺ In the next few days, until the expedition starts (Insha'Allah), we will set up our base camp (Insha'Allah). Tessa and Hadi Musallam, our main contact person with the Diwan who has supported us for many years in Oman, are already in the field to check the terrain. So, up to now, everything is on track.

Please be aware that I won't be me meeting you at the airport in Muscat, but a representative of NTT Oman, our Muscat travel agency partner (Insha'Allah). He will meet you as described in your dossier, distribute tickets and help you to check in for your Salalah flight (Insha'Allah). We will then meet you at the airport in Salalah (Insha'Allah). This is plan A, but it's always good to have a plan B when on expedition. So if our friend from NTT is not there by 08.45, please give me a ring on my Oman mobile (see below) or ring Ginu from NTT on +968 92 800281 sounding slightly worried that the man with your tickets has not turned up yet!

Altough it's very warm here at the moment compared to freezing Europe, I would like to remind to bring a set of warm clothes along, as we might get some chilly nights (Insha'Allah).

I'll send another update soon about the shape the pear is going to take this year ☺ But enough of scaring you with expedition lore – we do know what we are doing, honest, and we all look forward to meeting you in Salalah soon. My Oman mobile number (for emergency use only) is +968 92380988.

Safe travels

Ronald Seipold
Expedition Leader

20 January

Just a quick note from the field to say that everyone has arrived safely and is now well ensconced at base camp. We pulled all the stops out for base this year and I think everyone likes it. The food has also been well received and since an army marches on its stomach, all seems well so far :)

Temperatures are pleasant, but last night it rained a lot. Still, I am happy to report that everyone stayed dry in their tents. So much for Arabian desert nights…

We've gone through all the training sessions and everyone is now raring to go out and test their new-found naturalist skills in the field. One thing that has gone pear-shaped is that the 20 camera traps we had bought for the research have not arrived yet and are lost somewhere between Muscat and the inept supplier in Texas. The office are chasing hard, but to no avail so far. Everyone is blaming everyone else, of course!

But in true expedition-style, we switched to plan B, which is to find good spots to place the cameras once they arrive. They then have to stay in the field for weeks or months anyway and the important thing is to find good places for them and that means places close to where the animals move. So one of our main jobs will be to find well-used tracks in the depths of the remote wadis that surround base. Wish us luck.

25 January

The rain finally stopped early Tuesday morning giving us the chance to continue our training sessions outside. Tessa made us familiar with the datasheets and trained us for our surveys. After all this theoretical work we left base camp for our first training in the field. Following the advice of a local, who passed base camp on Monday afternoon, the whole team left in the afternoon towards the small village of Uyun where we split up into two groups. Rames (our local ranger), Erin and eight team members headed for a big waterhole. This very oasis like area, surrounded by cliffs with several caves, offered a surprising amount of birdlife (even water birds). Tracks and scat of fox and other unidentified animals will make us come back again to this place.

The second team met a local camel herder 6 km further east. This very friendly old man and his son were born in this area. After telling him about our project, he showed us a camel baby (only a few days old) and tasting fresh camel milk (really not that different from cow milk). Some neighbours who came by gave us an invitation to visit a group of about 18 men of a local tribe called Bed Kethir. Some of them are camel-herders as well and stay for several months with their camels in this area. There was a lot of great hospitality and interest in what we are doing. The outcome of our informal interview was that they hadn't seen a leopard for at least 8 to 12 years in this area, but the leopard should be still present around Wadi Uyun. We will hopefully find out. Besides our talk, it was a really interesting experience watching all these men sitting outside next to a hut, shielded from the wind by a wooden fence, around a camp fire, drinking tea, eating, chatting and laughing.

On Wednesday all of us went east of base camp to Wadi As Suquah, a very beautiful wadi with ledges, caves, a few Frankincense trees and a waterhole at the beginning, where we prepared a mud trap. Aside from some human disturbance, we found a great number of animal sign within this wadi, such as tracks, scat, feces of caracal, wolf, red fox, Blanford's fox, Arabian gazelle, Nubian ibex, White-tailed mongoose, honey badger, hyrax and hedgehog and furthermore sightings of a hedgehog, a cat snake (?) and some small lizards.

The next day we drove to a place south-east of Titam (close to Irahan), which is located close to the Dofahr Mountain range, an area that Hadi and Tessa spotted during our preparing time. The narrow wadis in broken terrain, thick scrub, ledges and caves appeared to be a very promising leopard area. However, it turned out to be really difficult terrain to survey: no trails, steep, thorny bushes all over the place. We had to turn several times and finally ended up at the same spot. But despite the fact that only managed to cover a small part of the wadi, we found lots of scat and tracks of wolf, fox, wildcat (fresh track). Tessa is convinced we may even find ibex signs here and plans to come back in the next slot at the latest. At night we got some more scattered rain, but there was little wind and the night-temperature is climbing every day.

On Friday we used our Land Rovers for a long distance off-road survey to the very large and deep Wadi Huttaw, south of base camp. On our way we passed several viewpoints that offered us impressive views into this almost Grand Canyon like landscape.

Hadi had asked us to survey this area for the Diwan. So we split into two groups to cover as much area as possible. When we met again, one group was a little bit disappointed about the low number of sign they had found, but the other team report a very high number of different, high quality tracks. Name any animal of this area, and believe it or not, we have found tracks of almost all animals that should be present. And yes, we think we may have found a leopard scat (although it's very old and difficult to identify)! Needless to say that, aided by a pleasant night under a clear sky of bright stars, we sat up by our camp fire, talking about the day's result and what they may mean, for quite a while

Yesterday one group went back to the big natural waterhole close to Uyun to have a closer look at this very special place. Being that close to Uyun, it was no surprise to find high human disturbance. But still the signs we have found were amazing: hyena, porcupine and wolf throughout the surveyed area (including a wolf skull on a ledge), fox, wildcat, gazelle, hedgehog (even scrapes), partridge, sand grouse and, for the first time, fresh ibex prints.

The second group had a longer walk from base camp up to the plateau and came back with signs of ibex, hyena (a lot of them fresh), fox and hyrax, as well as a dead camel. So, again a brilliant day, even though the heat during the day makes surveying hard work, especially on the plateaus.

Now, as we have already have reached half time of the first slot, I can say that this team is doing more than well. No accidents, no injuries, everybody is feeling well, the team spirit is tops, the meals are superb and the results of our research very significant and promising. The next chance for you of getting some more information about our expedition is during my next stay in Salalah and that's not before the end of this slot.

Speak to you then.

30 January

Last Sunday was a kind of day-off: part of the group accompanied us to Salalah to spend a few hours in a souk and at the beach. After some shopping, we picked up our new ranger Bakit and an additional team member (Humaid Al Ismaily from Shell, an important sponsor of Biosphere Expeditions in Oman). Axinja, Rob, Isa, Birgit and Ashley together with Khalid and Erin prepared their two-day overnighter and left early lunchtime to drive four hours to Wadi Amat, where we had left two camera traps last year. Those team members who didn't join the overnight stay returned to the big waterhole on Monday. On our way we spotted two gazelles on the plateau. The survey north-west of the waterhole met our expectations. We found a lot of signs of ibex (even fresh ones), wolf, fox (including sent-marks) and porcupine. On our way back to base camp we checked our mud trap at the small waterhole but no prints had been left.

Because all our surveys around the waterhole had been so promising we continued our efforts in this area. Tuesday we made our way directly through Wadi Uyun from base to the point where we finished our survey the day before. Not far from our starting point we spotted gazelle again, this time two females and a male on a slope just about 50 to 70 meters away from the Land Rovers. What a motivating start of our survey. And it was still in the beginning of our survey when Tessa observed a Blandford's fox running up a slope. But the further away we went from the waterhole, the fewer tracks there were. Nevertheless this part of Wadi Uyun is still of interest and we will come back again to have a closer look at some promising ledges and side wadis.

The overnighter returned late in the evening, tired on the one hand, but full of energy on the other. Of course there were a lot of pictures to be shown and stories to be told about their camel riding experience, sleeping outside under a clear sky of stars and the survey itself. Besides human disturbance and poaching activities (especially ibex) the team found abundant partridge, hyrax, gazelle and even caracal signs as well as fox, wolf, ibex, and hyena pugmarks and faeces or scat. Unfortunately none of the two camera traps had taken a picture, even though they been out in the field for a whole year.

Wednesday we left in two groups for a survey of Wadi Suqua, a follow-up of our first survey to the very end including a smaller wadi with heavy vegetation that runs parallel to it. As Wadi Suqua gets more and more narrow and boulders closed the way for camels, there were lots of Frankincense trees. Sadly we also found a bait tree and cartridges, a clear sign of poaching activity. Team members in the smaller wadi found ammunition and two animal skulls with clear gunshot marks. This explains perhaps the low number of tracks and other signs of animals such as gazelle, ibex and porcupine. Rewarding were the sightings of a juvenile porcupine and hyrax in both valleys.

On our last day we split up into three groups. Christian, Rasha, Nicole and Isa left base camp at 04:00 in the morning for an early morning observation at the big waterhole. Hours of waiting were finally (at about 9:00) rewarded by a sighting by Rasha: she was able to take a video of what we think was a black wildcat! There are stories around about this animal, but the existence of this special species has not been proved yet. Tessa has to examine this video on a big computer screen and will let you all know about the result. Well done Rasha!

The second group returned to the area near Iraham to explore a way further down into the valleys. This hardcore team worked their way through difficult terrain and managed to cover much ground. Even though it could not been proven that this is a good area for ibex and leopard and only few prey signs were found (very likely because of human disturbance such as road construction and poaching). We plan to come back to survey further parts of these steep valleys in the next slot.

The third group continued to survey Wadi Uyun towards the south-east of base camp. With the help of Roger and Rob we concentrated on observing birds as well. Besides a sighting of a small colony of hyrax, the number of animal signs was really low. At least we have found some gazelle and fox tracks close to base.

Overall we have found many very promising signs during the first slot that make us look forward to starting with the second slot. Even though the area was mainly new to us we have covered more ground than expected. Well, thank you everybody for your passion, interest, hard work and contribution. It really was a pleasure to be part of this exceptional team. I would like to add my special thanks to Erin who was a tremendous help from the very first minute.

And remember everybody: a high speed camel is much more expensive than a low speed camel because you don't have to feed it with honey, dates and eggs – that's reasonable!

Hope to see some of you back on one of our other expeditions.

7 February

The second slot got off to a good start with everyone arriving including their luggage. Training went well and soon we were out into the field. Right on arrival we were even able to observe three gazelles for quite a while whilst driving the Land Rovers towards base camp. One day later Khalid observed three more gazelles on the plateau near base. So, they are definitely around, it might even be the same group we have seen within the last few weeks.

I would like to welcome Khalifa Hamed Al Jahwari from the Diwan in Muscat, as well as Abdallah Said Al-Toki from Shell and Mohamed our new ranger for this week. Furthermore a warm welcome to Sarah Low who runs the Biosphere Expeditions office in Australia since November 2008 and is attending her first expedition. Until Tuesday we had four more guests:, namely the press people representing Times of Oman, Oman Tribune, Driven and host Asma Maqbool from Weber Sandwick. Thank you everyone for your interest. Spreading the word via the media like this is an important part of what we do here and it's good to have all this support from different quarters of commerce and the media in Oman.

We started our field training on Tuesday morning in Wadi Uyun, not far away from the big waterhole. In the afternoon some team members took the chance of getting an introduction to drive our LR Discoverys. It's pretty much of a challenge to go up and down the steep and difficult track near base, but Biosphere Expeditions seems to attract just the talented (or even experienced) drivers.

Wednesday we went back to Wadi Huttaw where we had some promising findings in the first slot. This time we had a closer look at an area in this stunning wadi a bit north of our last survey. And again we had a lot to talk about in the evening. Especially signs of old and fresh ibex including 20 (!) resting depressions. We also found some fresh and old signs of gazelle, although they seem to be less abundant compared to other areas. For the first time during this expedition there were signs (including sightings) of a big and active hyrax population. Furthermore very abundant partridge signs throughout the wadi, some hedgehog and several porcupine signs. Overall it was again a very successful day with tired team members that had to face a long off-road drive, a hot day and a steep slope of about 200 meters from the wadi bottom up to our cars.

Besides Roar;s and Grethe's exploding sleeping mats and Roberta's two broken pairs of shoes our gear is holding up well. Spirits are high and it base already feels like home…

Thursday we split into two groups. Team 1 with Tessa and Khalid again went to the big waterhole to examine a narrow and long side wadi north-east of it. The delta of these wadis was so promising when we had been there with members of the last slot that we had to come back. The terrain was pretty difficult to survey due to large boulders along the wadi. As these boulders blocked the way for camels into the wadi, Frankincense trees could spread and grow throughout. Besides one fresh wolf and ibex track at the very beginning, only a few old signs of wolf, ibex, fox and none of gazelle or small mammals could be found. On the other hand, porcupine and partridge signs were abundant and three smaller active colonies of hyrax could be added to our datasheets. Finally the team had an exiting finding: very old scat and a degraded old print of what we think must be leopard! We need more analysis before it can be confirmed, but we have already shown that the waterhole is very critical for Wadi Uyun and more scientific work should be placed right there.

Team 2 with Khalifa, Mohammed, Sarah, Roberta and Ursula headed for the small village of Uyun to interview the locals. Uyun was founded 1974 at a time when nobody used to live in this area permanently. Nowadays about 40 families live in Uyun. By chance the team met Sheik Said Sali Ghawas, a man of about 50 who comes from the area near Amat but has been living in Uyun since the beginning. He is the supervisor of the military checkpoint that we have to pass almost daily, so he was already aware of our presence. In his opinion the current absence of leopard (even though leopard was seen just two years ago in Wadi Uyun) is caused by the roads that give easy access to this area (including poachers), the change of climate (much drier than in the past) and human presence in general. He stated that people nowadays don't have a problem with the leopard anymore (in former times they killed baby camels) and they do understand the government's wishes to protect them. They are more concerned about wolf, hyena and fox that regularly come close to the village to scavenge food. Three years ago a wolf killed seven goats in the centre of the village. Another important piece to our puzzle.

Besides the interview the team was invited for a tea and met a baby camel and some kids of the village that liked to be photographed. Afterwards this team surveyed a small side wadi close to our vehicle parking spot and near the waterhole. Abundant gazelle tracks attracted their interest as well as hyrax sightings.

Yesterday Khalifa, Khalid, Mohamed, Yvonne, Klaus, Tessa and I had to swing a big challenge given by Hadi: a very long drive (a big part of it off-road) led us to the south into the region of Adhkadat Al Madrj (Dhofar Mountain Range) between Wadi Sawa and Wadi Urzuq. We parked at a plateau of about 1130 meters and climbed almost 400 meters down into a steep and narrow gorge to finally follow some ledges to a huge overhang. At this very remote place Hadi several years ago had successfully placed a camera trap. Hadi asked us to put one there again. This really exhausting trip was rewarded by stunning mountain views, very different vegetation and findings that were beyond our expectations: a long trail of leopard tracks (a female with a cub), four scrapes with two faeces (one for sure leopard) and a scent mark! Tessa: "I have never ever had so many leopard findings to state on one data sheet!" Needless to say we were all very excited about this. Pretty exhausted but happy we arrived hours later at the cars where we met Toby, Katie and Ursula who had accompanied us to this place to observe the plateau. Unfortunately they didn't find a lot of animal signs. But they several cartridges and military activity (small rockets).

Grethe, Roar, Roberta and Abdallah carried on surveying in the area close to base. Neither the wadi, nor the plateau yielded any remarkable signs. John (Jay) had to take a break as twisted his ankle yesterday on the way back out of the waterhole side wadi. Let's keep fingers crossed that he will recover soon.

Today is the day-off for all team members and Abdallah, Mohamed, Khalifa and Sarah are to leave the expedition. I would like to thank you all for your help and enthusiasm. It was great spending this first week together with you.

My next diary will arrive you in about one week, actually when this year's expedition in Oman will be already over. Time is flying!

13 February

On Saturday, our day off, we all spent some time in Salalah. In the afternoon we picked up Ali Tahar (from Shell) and Hassan, our ranger for the last week.

On Sunday the overnight team with Tessa, Khalid, Yvonne, Klaus and Toby prepared their stay away from base. They left around midday to drive a long way into a region west of base, called Mudayy. This region was chosen because it is west of Uyun and closer to the Yemeni border, quite remote, with low population and minor human disturbance as well as being within a higher range of the mountains. Topographically most promising was Wadi Aydam, a very long and big wadi, about 15 km away from Harwib and giving us a chance to compare biodiversity and leopard presence.

On the way to the first overnight stop, Rames, a ranger from that area was picked up. After a long drive (over 6 hours) they stopped just before it got dark, to set up tents. Next morning, the team continued their way finally to meet a herder with a camel. After having loaded up the camel with water, tents and food, they surveyed following the wadi until the natural waterhole of Hazzah.

On Tuesday everybody had to get up early to walk and drive about 40 km through Wadi Aydam and Wadi Tahit back to an off-road route finally to arrive back at base in time for dinner.

Besides having a great adventure, this foray gave us a much better understanding of the area – another small piece in a big puzzle. The findings were also remarkable as the team found one possible old leopard pugmark and signs of all kinds of other predators. The camel herder said that he had seen leopard pugmarks about 3 months ago – these were the only ones he had seen for a very long time. Furthermore they found many tracks of ibex and gazelle and had sightings of both species. On the other hand, the survey revealed very high livestock densities (camels and goats) and severe over-grazing along much of the wadi.

The team at base concentrated on surveys in side wadis of Wadi Uyun, east of camp. Having covered a lot of ground from the middle of the wadis up to some high ledges and although all wadis were very different in type, we found few (fresh) signs of leopard prey or other predators. It seems that the longer distance to the big waterhole near Uyun does have an impact on wildlife in these wadis.

Indicators for our hard work are Ursula and Roberta: they have lost their soles (soul?) in the wadis of Oman. With plenty of tape, straps and strings around their boots (setting a new outdoor fashion trend?) they kept on going and going. Also the heat during the day gave us a hard time, but we were rewarded by a great sighting of two gazelles, an eagle and some hyrax. The highlight for John (Jay) was on Tuesday when he was able to leave for some activity away from camp (he had been forced to rest for some days because of his twisted ankle). So, in the afternoon we went by car to the small waterhole to check the mud track trap we had prepared during slot 1. Unfortunately the water level had risen, obliterating the track trap. On our short walk back to the cars, we found a wolf track under an overhang of a huge boulder just next to our trail.

Wednesday was a day for interfacing with the local people. All of us drove back to the route leading to the so-called leopard cave area, where we had seen several small settlements along the way. There we conducted two interviews with different families: one interview was with a herder family that was very open. They keep over 150 goat and camels. They are afraid of the leopard, but tolerate it; hyaena and wolf they hate. They stated that they had seen leopard in that area about three months ago and heard a leopard in November. The second interview was with a herder who keeps about 130 goats. He couldn't remember any signs of leopard in the last few years and therefore had no opinion about the leopard. He was much more concerned about hyaena and wolf as well, as he had already had a few losses of livestock to them.

Thursday, our last day of surveying, we spent in one of the wadis close to base. A sandstorm in the distance filled the air with thick dust – a great scene especially during sunset. Our findings there were similar to the day before yesterday, so besides fox, gazelle and ibex there were few other signs. Again difficult terrain stopped camels from overgrazing and Frankincense trees had a chance to grow.

Amazing how time flies. All team members were more than sad to have just finished their last survey. "Why is it over as we are now really into it?" was the question most heard.

With some pride I would like to mention that this team might have set a new record in packing everything up on Friday. Thank you everybody for your great help! But besides the packing, you have all done a fantastic job in helping us to gain a better understanding of the area and the Arabian leopard's place in it. We are looking forward to continuing our work here.

Finally I must mention our sighting on our way back to Salalah when six vultures and two eagles feasted on a dead goat just next to the road…

All the best to you and hopefully I will see you on one of our next expeditions.

Ronald

P.S. Please don't forget to share your pictures! www.biosphere-expeditions.org/pictureshare

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2010

9 January

Welcome to the 2010 expedition diary. Just a quick one from me, Ronald Seipold, your expedition leader, to say that I am about the escape the European freeze from Frankfurt to hopefully much warmer climes in Oman.

We're all packed and ready to go, the Land Rovers are waiting in Muscat, as is a box of 20 brand-new camera traps and our whole camp equipment. So by the time you ready this, I should be in Muscat getting everything ready for you, Insha'Allah.

"Insha'Allah", by the way, is a phrase you are about to become very familiar with. I usually introduce new expeditioners to this phrase right from the start, so I'll do it again in this first diary entry: Insha'Allah translates roughly as... 'If Allah wills it' and is a marvelously useful term of complete fatalism and one which has no direct English equivalent. The nearest thing would probably be '...but on the other hand I might get hit by a number 73 bus tomorrow' - uttered in tones of sodden dejection by a clinical depressive with a strong Solihull accent.

So far so good. I'll e-mail more from Muscat in due course. Please make a note of my Oman mobile number (for emergency use only), which is +968 92380988. I look forward to seeing you all soon.

Safe travels

Ronald Seipold
Expedition Leader

16 January

First things first: apologies that this diary entry is slightly later than intended, however...
Busy, busy, busy! A successful press conference with our partners at Land Rover in Muscat resulted in some positive press in all the major national newspapers. After that, the set-up team and I made the lengthy trip to Salalah overland. Since then there has been a tremendous amount to prepare over the past few days, but I am happy to report that base camp is now fully operational.

This year's campsite has a slightly different feel to that of last year, due to the neighbouring presence of a camel herder and his inquisitive livestock! However, the site I have chosen is - I can promise you - absolutely stunning. It is located in the heart of a beautiful rocky valley known as 'Wadi Ayoon', where we have conducted research in previous years. The night skies are breathtaking, and the sunrises are awe-inspiring. And yes, it is DEFINITELY warmer than anywhere in Europe at this time! Nonetheless, please note that as evening approaches, the temperature drops significantly, and a set of warm clothes is indispensable.

As meals are always important on expedition, we (the set-up team) have been sampling the wares of this year's catering expert, Ashraf, and we are pleased to report that he is a talented cook with a delicious array of recipes at his fingertips. For those of you who are lucky enough to be joining us here in Salalah, please be aware that I will not be meeting you personally at the airport in Muscat; this duty will be undertaken by a representative of our partner travel agency, NTT. I am, however, very much looking forward to welcoming you to base camp and we will be picking you up at Salalah airport.

As always, this diary must end with an obligatory "Insha'Allah."

23 January

A good start to this year's expedition: no delayed flights, no missing luggage or team members and everyone had a safe trip to Salalah.

On our way to base camp we had a short stop for lunch and enjoyed an awesome view from the mountains towards the nearby coastline. After a walk around camp with a short introduction about camp life and procedures, everybody had some time to settle in. This was followed by a get together and a great dinner by Ashraf, our cook from Bagladesh. We spent our first evening in the field around the camp fire. Everybody was in a good mood and I knew that we will be an easy-going team with the right spirit for the coming challenges.

The next day was filled with a lot of information: talks on science; the background of this project; training sessions on GPS; compass; data sheets and a Land Rover driving course. Tuesday was our first time out in the field, which consisted of a training survey close to base camp, with findings of signs of porcupine, hyena, gazelle, ibex, fox and hyrax. In the afternoon we checked our new camera traps and familiarized ourselves with how to handle them. Finally, we placed one trap a bit up a slope, next to a hyrax colony about 500m away from base camp.

The next day we headed to the most important spot in this area, several kilometres away from camp. It is a big waterhole in Wadi Uyun with a lot of green-like reeds alongside it. This natural water reservoir is very important to most of the animals during the dry season. Signs of carnivores as well as prey species of the leopard and not to mention birds, were seen during last year's expedition. So, for research purposes, it is a real hot spot.
We were welcomed by 12 steppe eagles! During the day we found a lot of signs of porcupine throughout the surveyed area but probably fewer signs of hyaena, gazelle, ibex, wolf and hyrax, than last year. An important research task this year will be to figure out these numbers. We found promising spots to set up three camera traps – one more reason to come back and check the results.

On Thursday we split up into three teams to survey Wadi As Suqah - a side wadi of Wadi Uyun between base camp and the waterhole. We had some amazing sightings: 2 ibex about 250 metres, away half way up a slope; hyrax playing around; a hedgehog and even a Verrioux eagle – a very endangered species.

Yesterday, we went back to another spot which is very important to our research. Locally, it is called 'leopard cave' - an area south-west of base camp within the Dhofar Mountain Range, approx. 70km drive away. This area is very remote and difficult to get to, hidden in steep valleys and down about 1000m in altitude. In the past few years signs of leopard have been found, such as during our expedition last year.

Because of the very difficult and demanding terrain, a small group (Pat, Te, Herbert, Tessa and Khalid) went on this challenging tour. A second team examined the surrounding area for future surveys, as little is known about this area.

Late in the afternoon we all met together on the plateau for our drive home. Well, you should have seen the excitement of everyone, especially from our scientist, Tessa! Beyond all expectations, the 'leopard cave' team found about 45 scrapes, within 250 metres of each other (some of them with fresh urine) a lot of tracks (probably from one male and female), scat (they ran out of scat bags), a rock scent of spray and claw marks on a tree, possibily the first found in Oman!

And believe it or not even our "B"-Team has found leopard scat ! Wow – I am a little afraid of running out of exciting news for my next diary entries.

Well, the first week of this slot is over and we have had successful time. The team has worked hard but has enjoyed every minute. The nights around the camp fire were inspiring, amusing and we played a lot of crazy games. I'm definitely not allowed to tell you more … The weather helped us adapt to the conditions in the field, as it was often cloudy and therefore not as hot. Some nights are still a bit chilly but overall are pleasant.

Today – Saturday - is our day off. As I am writing this diary everybody is hopefully enjoying a day in and around Salalah. Unfortunately Pat and Claudius, our press guys from Austria and Australia, have to leave us as well as Rames our Ranger who will be replaced by Rames II for the next 10 days. Thank you to all of you: it was more than a pleasure to having you on board, working hard and helping the team.

Let's see what the next week will come up with …

29 January

After our day-off on Saturday, we commenced the second half of Slot One. We drove to a place South-East of Titam (close to Irahan), which is located in the North of the Dhofar mountain chain. One team surveyed some narrow valleys in rough terrain with thick scrub, ledges and caves- an area we visited last year for the first time. It is a promising region for leopard, despite several nearby settlements. The team found two possible (one probable) leopard tracks, some old faeces, and one possible leopard scrape. We found a great deal of carnivore scat, fresh gazelle tracks and faeces, and saw a hyrax.

Team Two (Jens, Herbert, Khaled and me) explored the mountain range further south-east, in search of a site for an overnight camp for Slot Two. Local people from the small settlements in this area confirmed that we would be likely to find wolf, hyena and even leopard signs there. They warned us that the terrain would be tough, with limited access and difficult pathways. As we returned in the afternoon to meet up with the exhausted members of Team One, we all acknowledged the fact that the weather is definitely becoming hotter by the day!

On Monday we all visited the elementary school in the small village of Uyun. There was much excitement and curiosity at the arrival of so many foreigners! Numerous teachers and students squeezed into one small classroom to listen to a presentation given by Khaled about Biosphere's work in Oman. Khaled appears to have become something of a celebrity in his home country, due to the fact that he took part in a recent documentary film about leopard research and protection. This film was shown on Omani TV, and many of the villagers were aware of this.

We hope that our visit and Khaled's presentation will have further raised awareness of the importance of wildlife conservation, particularly amongst young people, many of whom are currently rather more focused on technology-based education and modern-day leisure pursuits. The current trend amongst many young Omanis seems to be slanted towards gaining a well-paid job in the city, leaving them with little interest in conservation issues.

That same afternoon we surveyed the area of Wadi Uyun which lies between this year's base camp and last year's campsite. We also met and interviewed a local camel herder who is currently ensconced at the same site as last year's base camp. Our survey revealed hyena tracks and faeces (old and fresh), some signs of red fox, ibex and a lot of porcupine, as well as observations of hyrax and five gazelles.

The camel herder showed us a five-day old baby camel, and offered us a taste of fresh camel's milk. He reported no recent signs of leopard in this area, but he had heard a wolf's call just some days previously. He told us about a small waterhole in a side-wadi off Wadi Haydad, of which we had previously been unaware.

We followed the camel herder's advice and the next day a team headed straight for the waterhole. A second team worked its way through the main valley of this huge wadi. On our way into the wadi, we observed nine sand partridges and three Arabian partridges- birds we have not previously noted in this area. Soon after this, our local guide Ramses spotted a gazelle bounding up a slope about 300m ahead of us.

The waterhole proved to be an attractive little oasis shaded by palm trees within a narrow side-wadi. The pool itself is about 50m across and approximately 1.5m deep, with a natural spring which flows year-round. The team found fewer tracks than expected, but they did come across a lot of gun cartridges (17 in total), much human disturbance, and a hide for poachers. Despite this, Biosphere will definitely re-survey this important site for wildlife. The second team, meanwhile, found tracks of ibex and gazelle, which indicate that these animals may well frequent this waterhole.

In the afternoon we prepared for our overnight camp. The entire team left base camp at 3.30pm. Soon after our arrival at the newly selected site, everyone helped to set up camp. Tessa, Sybilla and Tenille then set off to survey a small valley nearby. Afterwards, a pleasant evening was spent around the campfire, with friendly chatter easing us into a comfortable night under the stars.

Early on Wednesday morning we split up into two teams to survey this potentially perfect leopard habitat. Despite our initial recce of this area, both teams struggled to find easy access into the wadis, with ledges, caves, steep drops and scrub abounding. Team One, with Tessa, Ramses, John, Wolfgang, Jens, Sybilla and Herbert, were eventually forced to adapt their original plan and to skirt around the steeper slopes, finally descending to some caves on the side of another wadi. Despite these challenges, we nevertheless discovered two possible old leopard tracks, but these were not distinct enough to be readily confirmed.

After two attempts, Team Two, with Khaled, Roxy, Marion, Tenille and me, we found a route down and were able to descend into the valley. We found fewer signs of wildlife than expected, but I am able to report an exciting observation of a wolf, which was running towards a cave not more than 150m in front of us. Shortly after this sighting we heard some donkeys braying, and- believe it or not- we then saw the wolf chasing two of these donkeys up onto a nearby ridge! The unlucky animals must have crossed his path by chance. In the excitement of all this and watching the donkeys escape, we forgot to take pictures of this memorable incident! Unsurprisingly, we found a lot of fresh wolf tracks in this area which matched up with our sighting.

A long and exhausting overnight camp and survey came to an end with a welcome pot of tea, brewed on the campfire. We will return…!

Thursday saw us split into two teams again; one of which was tasked with returning to the main waterhole which gives Wadi Uyun its name, in order to check the camera traps we had deployed there and to continue our survey of that area. The camera traps worked well and yielded several good quality pictures of porcupine, honey badger, red fox, hyrax, mongoose, possibly a Gordon's wildcat… and plenty of camel legs! These photographs will be analyzed at a later date to confirm the identities of all the species captured on camera.

The second team meanwhile returned to Wadi Haydad to set up a new camera trap at our recently-discovered waterhole, and to extend the survey further up the main wadi. According to Tessa, the tracks and signs in this area indicate a higher level of ibex activity than has been recorded in any previous year.

I must not forget to tell you about our 'pet porcupine' at base camp, who has been photographed several times every night by the camera we have placed by the kitchen tent! (However, professionalism prevents me from revealing the identity of the team members who have been caught wandering past this camera in the middle of the night!)

Time flies, and it is already the end of Slot One. Today we headed back to Salalah and bade a fond farewell to all the members of our first team. Enormous thanks for their hard work, dedication and good humour throughout the two weeks with us. We really appreciated their flexible attitude and high levels of motivation, which have definitely led to some valuable results. Sincere thanks to everyone involved, from us at Biosphere, and from the leopards of Dhofar! I hope to see you again in the future, somewhere in the field.

The support team are now all looking forward to welcoming the participants of Slot Two on Sunday. Safe travels to you all.

I remind everyone that pictures from this expedition can be shared at: www.biosphere-expeditions.org/pictureshare

6 February

Slot 2 began successfully last Sunday, with all team members and their luggage, arriving on schedule. We also welcomed to the team, Ali Salim Al-Salimi, from Shell Oman, which is one of our major sponsors here. The ranks were also swelled for the first three days by journalists: John Henzell (from The National newspaper in the UAE); Arya Rudra (from The Times of Oman) and; Adil (from Al Shabiba, an Omani, Arabic language newspaper). The new recruits had an auspicious start to the expedition with a sighting of ten gazelles, en route to camp. We haven't seen such large a group before.

After the training, Tuesday was the team's first full day in the field, with successful surveying around the Ayoon waterhole. Tessa and the team recorded plenty of tracks and signs of various species, and everyone enjoyed seeing pictures of porcupine, honey badger, striped hyena and fox on our camera traps.

Wednesday saw the departure of our press members, whom we would like to thank for their interest in our program. I joined the team in Wadi Thor (a large valley adjoining Wadi Uyun). They had noted tracks and faeces of hyena, wolf, red fox, gazelle, ibex and hyrax. They also had recorded rare wildcat tracks. Just as I arrived, a smiling Tessa descended from a ledge reporting that she had seen a leopard pug-mark; old but extremely clear. This is the closest sign of leopard recorded in the Wadi Uyun region near our base camp.

Later we observed five gazelles and Tessa observed a leopard scrape. This had been an extremely productive and worthwhile day for the team.

The following day we returned to the Dhofar Mountain Chain region to survey new territory. We had made some valuable discoveries here during Slot 1. Strong winds and cloud cover made temperatures quite pleasant, however, rough terrain and numerous boulder fields led to a challenging and somewhat exhausting day for the team members. The reward was that on the way down the mountainside we discovered four possible leopard scrapes, of which one was definitively identifiable by its distinctive scent, which could not have been much more than three days old. Our concentration was momentarily distracted by the sound of three gunshots. Through binoculars we observed a hunter making his way across the hillside opposite where we stood. He quickly moved away and we did not see or hear him again that day.

Once we reached the wadi bed we branched out into three teams. Our combined findings include: honey badger faeces, old wolf tracks, sightings of partridge and hyrax, eleven carnivore scats, hyena tracks and a possible old leopard scrape near eighteen leopard pug-marks (tracks) beneath an overhang. Very valuable and exciting data.

Strong, windy conditions were experienced back at the campsite that evening resulting in some altered tent shapes! Despite this, the team was up bright and early on Friday morning, ready for the next survey. Ben, Leslie, Frances and Toby chose to go with Tessa and Khalid for another tough few hours of mountain climbing and bush-whacking in the same area as yesterday. They forged their way through thick vegetation and steep canyons, with Khalid managing to reach some extremely high and virtually inaccessible caves, where he found two old leopard pug-marks. Old tracks of hyena and wolf were also found in that area.

Team Two, comprising George, Irmtraud, Tess, Ali and Goeran, joined John, Mohammed and me in a survey of an unnamed wadi on the south side of Wadi Uyun, which has its entrance approximately 1km from our base-camp. We recorded fresh and old gazelle and ibex tracks / scat along the sandy ledges. On our return, eagle-eyed Mohammed and Ali spotted the familiar group of five gazelles seen on several occasions in this area. We are all extremely pleased and relieved that the strong winds have dropped and after an unexpectedly hot day we were able to enjoy a balmy evening around the camp fire.

As I am writing this diary the team is enjoying a well-earned day-off in Salalah. Here's to a successful week ahead. The correct link for picture share is www.biosphere-expeditions.org/pictureshare

12 February

An enjoyable day off was spent by the whole team in Salalah last Saturday. The next day we interviewed local people in the village of Haluf in the Mushaylah district, which is home to one of our rangers, Mohamed. The team enjoyed traditional Omani hospitality, including being offered tea and the chance to buy local handicrafts. We then spoke to the villagers about their attitudes towards wildlife, and which species they encounter in their daily lives.

On Sunday afternoon we visited our neighbour in the wadi, Salim the camel herder. He demonstrated how to milk a camel and offered the team fresh camel's milk and the chance to ride one of his camels.

As we sat around the campfire that night a few spots of rain began to fall. This soon turned into a major downpour, which saw everyone scurrying for their tents. Fortunately all the tents remained waterproof during the night, except Tessa's, which turned into a small swimming pool! We awoke on Monday to a misty, drizzly morning.

The weather improved in the early afternoon and we returned to Wadi Ayoon to investigate the Mushaylah district. On the way, we saw a gazelle being chased and harassed by a steppe eagle. Toby and Ben ran up and over a rocky bluff to observe and reported that the gazelle managed to escape its pursuer.

We also sighted a Blandford´s fox and spotted eagles. The terrain here was markedly different to the wadis we have surveyed, and appears to provide a potential wildlife corridor, particularly for predators. The data we gathered has added significantly to our knowledge of the region and its wildlife.

On Tuesday we traveled off-road to a hugely impressive wadi system named Wadi Huttaw and split up into two teams to survey. The team in the eastern area found a few carnivore tracks and some hyrax colonies, with some ibex tracks on the higher ledges. The western team found fresh tracks of hyena, wolf and Blandford´s fox, huge colonies of hyrax, a remarkable number of signs of small mammals, evidence of a high amount of game-bird activity, many tracks of ibex, and some signs of gazelle. One group of more than forty Hyrax was seen hopping from rock to rock in a frenzy as the team approached their burrows (who observed whom in this instance...?!)

On Wednesday, Khaled, Tessa, Lesley and Ben headed back to the 'Leopard Cave', to check the camera trap. They returned with a large amount of findings: a wolf track, ibex tracks and faeces, lots of honey badger scat, mongoose tracks, evidence of game birds, a hyrax sighting, and... fresh evidence of continued leopard activity! Tessa is convinced that there are currently at least two adults (possibly a male and a female, and maybe even a juvenile) inhabiting this wadi, as the team found two different sets of fresh tracks, more faeces, scent marks and fresh scrapes. Within a newly-surveyed area of less than 1km they counted 38 new scrapes to add to the previous survey's total. There were three instances where patches of sand had been re-scraped since our previous visit, plus one completely new scrape within the area surveyed by the Slot 1 team. Tessa was particularly delighted to observe fresh pug-marks on top of the Slot 1 team´s footprints, which undoubtedly proves the high amount of recent leopard activity in this amazing area.

Due to an unfortunate camera malfunction, we have not been able to successfully capture any photographs of scientific value from our camera trap set by Slot 1. The camera trap has been re-set and will remain in this location, so keep your fingers crossed!

A second team set out on Wednesday morning to explore a new wadi between Wadi Huttaw and the foothills of the Dhofar mountain chain. Descending from a height of about 1000m, they entered an unnamed wadi which was incredibly abundant with frankincense trees. The vegetation in the wadi bed appears to be regenerating, although one renegade camel was observed in the act of munching unashamedly on the leaves of a frankincense tree!

On our last full day the team split into two and set out to collect the camera traps from the field and do short surveys (the photos have yet to be checked so I can't give you any results. Then began the process of packing up the base camp, followed by a summary from Tessa of this year's expedition's scientific findings and results. Generally speaking, there have been higher amounts of gazelle and ibex activity in the area close to base camp compared with last year. Furthermore, a larger degree of possible leopard signs (scat, scrapes and tracks) have been found in various surveyed districts. It also appears that the 'Leopard Cave' area has been in much more frequent use by leopards than in preceding years. These positive outcomes give Biosphere a promising outlook for future conservation work in the region.

As base camp is now packed away and Slot 2 team are ready to depart, I would like to thank everyone involved in making this year's expedition so successful, rewarding and enjoyable. Special thanks must go to our extremely helpful local ranger from the Ministry of Environment and Climate Affairs, Mohamed; Ashraf; our incredible cook; my assistant leader John Highmore (well done, big guy - everyone particularly enjoyed your jokes, stories and songs around the campfire!); our cheerful and obliging contact from our sponsors Shell in Oman, Humaid Abdullah Al-Shuaili; and not forgetting Khaled Al Hikmani from the Diwan of the Royal Court, who once again proved to be of invaluable help throughout the expedition, as well as a valued friend and an extremely hardworking colleague, without whom none of our successes could have been attained. Here's to next year!

Team members from Slots 1 and 2, please don't forget to share your photographs on:
www.biosphere-expeditions.org/pictureshare

Safe travels, long-lasting good memories... and I hope to see you again on a future expedition!

Ronald