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Abstract: The Arabian leopard (*Panthera pardus nimr*) is categorised as Critically Endangered on the IUCN Red List. Several workshops on Arabian leopard have been held as part of the annual meetings on conservation of biodiversity in the Arabian Peninsula sponsored and organized by the Sharjah Environment and Protected Areas Authority (EPAA). The Arabian leopard workshops were facilitated by Drs Urs and Christine Breitenmoser, Co-Chairs of the IUCN Cat Specialist Group. The workshops included a global status review (published in Cat News Special Issue No. 1) and development of a conservation strategy (currently in press). During this process, Yemen was identified as a key range state for conservation of the Arabian leopard but its current status there is unclear. Local reports suggest that leopards may still be present in a few localities but no systematic field work has been carried out to confirm these and there is a chronic lack of in-country capacity for survey and assessment. This project aims to address both issues and has two principal objectives: (1) carry out a rapid assessment survey of Wada'a, the most prominent area of Yemen with recent confirmed records of leopards, and (2) initiate a capacity-building programme to ensure long-term sustainability of leopard conservation within the country.



Arabian Leopard Assessment in Yemen

Technical Report to Sir Peter Scott Fund

**Assessment of the situation of the Arabian leopard and initiation of a
capacity-building programme in the Republic of Yemen.**

Contract no. PSF 2007/003.

Technical Report

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Cover photo: Head guide, Hussain Ali Saleh surveying leopard habitat in Wada'a.

1. OVERVIEW

The Arabian leopard (*Panthera pardus nimr*) is categorised as Critically Endangered on the IUCN Red List. Several workshops on Arabian leopard have been held as part of the annual meetings on conservation of biodiversity in the Arabian Peninsula sponsored and organized by the Sharjah Environment and Protected Areas Authority (EPAA). The Arabian leopard workshops were facilitated by Drs Urs and Christine Breitenmoser, Co-Chairs of the IUCN Cat Specialist Group. The workshops included a global status review (published in *Cat News Special Issue No.1*) and development of a conservation strategy (currently in press).

During this process, Yemen was identified as a key range state for conservation of the Arabian leopard but its current status there is unclear. Local reports suggest that leopards may still be present in a few localities but no systematic field work has been carried out to confirm these and there is a chronic lack of in-country capacity for survey and assessment.

This project aims to address both issues and has two principal objectives: (1) carry out a rapid assessment survey of Wada'a, the most prominent area of Yemen with recent confirmed records of leopards, and (2) initiate a capacity-building programme to ensure long-term sustainability of leopard conservation within the country.

Project partners are IUCN/SSC Cat Specialist Group; Environment Protection Authority, Yemen (EPA); University of Sana'a; and EPAA/Breeding Centre for Endangered Arabian Wildlife (BCEAW), Sharjah, UAE. BCEAW maintains the international Arabian leopard studbook. During the course of the project, the Yemen Leopard Recovery Project (YLRP) was established as an independent initiative within Yemen and also became a project partner.

Three field trips were made to Yemen:

1. 10-23 December 2007
2. 27 December 2008-7 January 2009
3. 11-19 March 2009

The long delay between the first and second visits was caused by a sharp deterioration in the security situation in Yemen (two Belgian tourists and their guides were shot dead in early spring 2008, kidnappings of foreigners and bomb attacks on the Italian and American embassies in Sana'a in summer-autumn 2008). Consequently, we were advised to delay a visit until the situation became calmer.

Project coordination was facilitated by informal meetings of several partners at the annual biodiversity workshops held in Sharjah, UAE, in February 2008 and February 2009.

The main field trip to Yemen lasted from 10-23 December 2007. Participants were: Dr David Mallon, Julien Fattebert (Cat Specialist Group); Dr Abdul Karim Nasher, Dr Masaa Al Jumaily (University of Sana'a), Omer Baeshen (Environment Protection Authority), Kevin Budd, Dr Jane-Ashley Edmonds (Breeding Centre for Endangered Arabian Wildlife, Sharjah). Local officials and guides also participated at different stages of the visit. The main aim was to carry out a Rapid Assessment Survey of Wada'a, conduct some field training, and make short visits to three other locations: Bura'a PA, Maswar and Ta'iz.

The main aims of the second visit were field trips to Jebel Bura'a/Jebel Raymah and Wadi Sharas and Bani Al'Awwam; trial a questionnaire survey in Hajjah governorate and hold a project meeting to discuss future survey priorities. Participants were: Abdul Karim Nasher and Ibrahim Al Shammakh (Sana'a University), Omer Baeshen (EPA), David Stanton (YLRP) and David Mallon. The Minister for Water and Environment, Mr Abdulrahman Al-Eryani participated in the project meeting.

The third trip to Yemen, 11-19 March 2009, was mainly related to a different project, but 3 days were spent on leopard project work: field trip and local interviews in Al Mahwit governorate and follow up visit to Ta'iz, plus meetings.

2. OBJECTIVES

2.1 Rapid Assessment Survey of Wada'a area (Completed)

2.1.1. The Rapid Assessment Survey

This was successfully accomplished on the first field trip (December 2007).

Many of the Arabian leopards currently in captivity were either captured in Wada'a or are descended from animals caught there. The inhabitants of this area have traditionally used stone traps to catch leopards which were then sold or exhibited in a small menagerie in Sana'a. The menagerie was later merged with the city zoo. Wada'a is also the only region of Yemen that has provided reliable records of leopard presence over recent years. Brief reports on the area and leopard trapping were published 1995 and 1999 but many of the basic ecological parameters have not been investigated.

One of the team (AKN) made a brief visit to Wada'a in January 2007 to establish contact with local community leaders and the EPA office in Amran. Local people reported that leopards were still present at that time. On the December 2007 field visit the team were accompanied by the EPA representative in Amran Governorate, Abdurrahman Al Mu'allimi, and two other members of staff, plus a police escort provided by the Governor of Amran. We were hosted in Wada'a by Sheikh Mohammed al Hashidi who kindly made the village school compound in the main settlement, Al-Dhil'ain, available to us as a base. Two former leopard trappers, Hussain Ali Saleh and Hussain Ibn Hussain Abu Hassan acted as guides. The visit to Wada'a comprised foot surveys, interviews with local leaders and villagers, and public meetings to discuss leopard conservation and raise awareness. The visit aroused considerable interest among the local community.



Fig. 1. The field team in Wada'a

Wada'a is a sub-district of Amran Governorate, situated north-west of Khamir in the western highlands of Yemen and covers an area of about 500 km² - the boundaries are not well defined. The main settlement, Al-Dhil'ain, lies at an elevation of 1960m. Most of the area consists of an open limestone plateau with sparse vegetation and leopard habitat is restricted to two deep wadis, Al Lafaj Al Yamani, and Wadi Salta on the southern edge of Wada'a.



Fig. 2. Google Earth map of Wada'a field site.

Al Lafaj al Yamani is an upper tributary of Wadi Mawr, one of the major wadi systems that drain the western highlands of Yemen. Al Lafaj al Yamani is about 400m deep below Al Dhil'ain. The topography is complex, with numerous small side-wadis and steep, rugged terrain. Farther downstream, the wadi becomes somewhat shallower and less rocky but still contains suitable leopard habitat. The upper point of the wadi was marked by a 200m high cliff with dripping water and dense vegetation. Above that point the wadi is much shallower. Field survey effort was restricted to two sections of Al Lafaj Al Yamani and one tributary, Wadi Salta (Fig. 2). According to the local guides, it takes 3-4 days to walk to Wadi Mawr. It was not possible to undertake this journey due to time and logistics constraints, and the need to contact the communities farther downstream in advance. No roads cross the wadi so it was also not possible to visit areas on the southern side.

At the time of the field visit, during the middle of the dry season, several small pools and one stretch of running water remained in the wadi. Local information indicates that water flow is much higher during the summer and early autumn. The wadi bed contains patches of trees, mainly *Ficus salicifolia* with some *F. sycamorus*, and *Commiphora* spp. *Zizyphus spinachristi* and *Commiphora* trees and bushes such as *Capparis spinosa* grow on the wadi sides, sometimes forming small thickets. *Adenium obesum* is prominent among herbaceous plants.

Fig. 3. Upper section of Lafaj Al Yamani



There is no habitation in the wadi. A few terraced fields have been constructed at one point but are now abandoned. Livestock are sometimes taken to the wadi to graze and herders may stay overnight, using rock overhangs as shelters for themselves and their animals. No livestock and few signs of grazing were seen in the upper part of the wadi.

All villagers questioned agreed that leopards were still present but were now much rarer than formerly. One interviewee reported seeing a female with young in 2005 and other villagers provided reports relating to 2007. The rocky terrain provides limited areas of substrate suitable for registering tracks. One felid pugmark in a small patch of mud measured 78 x 75mm and represented the most

convincing evidence of continued leopard presence. Other tracks in sand measuring 67 x 64mm could conceivably also be caracal (*Lynx caracal*) though this species was reported to be rare in the area. Two old scrapes, very characteristic of those made by Arabian leopards, were seen. Several striped hyena (*Hyaena hyaena*) tracks and hamadryas baboon (*Papio hamadryas*) tracks were also found.

Prey species reported in the area include hyrax (*Procavia capensis*), hares (*Lepus capensis*), hamadryas baboon (*Papio hamadryas*), Nubian ibex (*Capra nubiana*) and partridges (*Alectoris melanocephala*). No signs of ibex were found during the foot surveys. Signs of hyrax and baboons were observed and small parties of partridges were seen. Baboons are persecuted for their crop-raiding habits while hyrax and ibex are traditionally hunted for their meat.



Fig. 4. *Margaba* – leopard trap

Stone traps called *margaba* are used in several parts of the Arabian Peninsula to catch leopards, but local people insisted that Wada'a was the only place in Yemen where these traps were used. These traps measure about 3m in length and are up to 0.75m high (Figs 4 & 5). Bait is placed at one end and when the leopard seizes this, a stone door is released, trapping the animal inside. Once caught, the leopards are transported to the village in a steel box. One steel cage trap has also been used occasionally. The *margaba* are sited at several points in the wadi bed and on the sides. Trapping was carried out by two families, one in Ad Dhil'ain village and one in Al Howbeh. The two principal trappers acted as guides on the foot surveys and both were interviewed in detail. Hussain Ali Saleh said he had caught 10 leopards and Hussain Ibn Hussain Abu Hassan has caught four. The last leopard was trapped 3 years ago and they both assured us that trapping had completely ceased in Wada'a. The five *margaba* examined were all inoperative.



Fig. 5. *Margaba* – front view

Leopard predation on livestock used to occur quite frequently but is now rare. Most attacks take place either in the wadi or when sheep and goats are going to or from the villages. Very occasional cases were reported of leopards coming to the village at night. One example described concerned a leopard that managed to enter a sheep pen through the ventilation hole in the roof and killed 70 sheep/goats in one night. The long and taxing descent into the wadi and back limits the frequency of visits by livestock herders. Flocks graze more often on the plateau, around the wadi rim and upper slopes, and in the lower section below Al Howbeh, where access is easier. No signs of heavy grazing pressure were found, in the form of tracks, droppings or evidence of browsing on trees and shrubs.

The attitude of the local community towards leopard conservation is now very positive and seemed to be reinforced by the arrival of a group of international and national conservationists. At public meetings in Al Dhil'ain and Al Howbeh, people expressed great pride in 'their' leopards. They have a collection of newspaper cuttings referring to the leopards and the area. Trapping had ceased over one year ago in response to appeals from the government and from Dr Abdul Karim Nasher and they now want to protect them and see the population increase. The community's attitude provides a very sound basis for a future conservation programme in Wada'a. A series of measures are currently under discussion with government and other agencies.



Fig. 6. Village meeting in Al-Dhil'ain

Subsequent visits were made to the area by AKN, OB and DS accompanied on one by the Minister for Water and Environment, Mr Abdulrahman Al-Eryani. These visits were successful in terms of restated commitments by local community to leopard conservation and initial discussions on declaration of a Protected Area to cover leopard habitat. However, a local tribal and political dispute has soured the atmosphere in Wada'a to an extent that made follow-up visits impractical, and the minister and the Governor of Amran strongly advised against any further engagement until the local dispute has been resolved.

2.1.2. Conservation actions needed

After discussions in Wada'a, the following measures were agreed as immediate conservation priorities:

1. Maintain ban on trapping leopards (Sheikh Mohammed and villagers insisted this would remain)
2. Monitor leopard presence in the area using camera traps and 'track impression pads' (patches of sand or soft earth placed along movement corridors)
3. Appoint 2-3 'Leopard Wardens' (LW) and pay them a small sum each month (initially selected from the experienced leopard trappers)
4. Provide training in camera trapping techniques for LW
5. Provide training in field sign recognition for villagers
6. Produce educational material in Arabic for local school
7. Maintain regular communication between Wada'a and Sana'a (Sana'a University/EPA and Amran governor's office)

In the short- to medium-term:

8. Develop a leopard conservation agreement with the local community (either a formal protected area or a more informal agreement)
9. Extend survey work downstream to Wadi Mawr (as tribal relations are not all good this will need careful logistical planning with the Governor's office in Amran).

Sheikh Mohammed has contacted Dr Abdul Karim Nasher by phone several times to pass on recent reports of leopards. The possibility of protected area status was discussed by the minister at a village meeting in early 2008 and received a generally positive response. Progress on all these measures has stalled following the start of the local dispute in spring 2008 and which is still not settled.

2.2. Surveys of other sites

Brief surveys of several other sites were carried out on the first field trip and also on the second field trip because a follow-up visit to Wada'a was not possible. The emphasis of all these was on other parts of the Wadi Mawr system and on Jebel Bura'a to the south. All incidental information relating to leopard status and conservation was recorded, and locations with anecdotal reports of leopards were listed. Fig. 10 shows sites visited and localities where leopards have been reported.

2.2.1. Maswar/Wadi Dhulum

Wadi Dhulum is situated in Maswar district, south-west of Wada'a and also in Amran governorate. The wadi is very steep and rugged but almost all the adjacent mountain slopes have been terraced for agriculture and the area is now heavily settled. The leader of the local administration and several villagers were interviewed: all confirmed that leopards had formerly occurred in the wadi but had disappeared from there and the Maswar region with the expansion of human settlement and agriculture. There had been no signs or reports of leopards for at least 10-15 years.



Fig. 7. Maswar area and Wadi Dhulum

2.2.2. Hajjah governorate

This is situated adjacent to Amran, and also contains a large block of the western mountains, including much of the Wadi Mawr catchment. Hajjah governorate was selected as the trial location for a local questionnaire (see below). Two areas with reported leopard presence were visited, Wadi Sharas and Bani Al 'Awwam. Residents in Wadi Sharas insisted that leopards still occurred in the area. One of them, Mohammed Tawfiq, proved very knowledgeable about leopards, their tracks and calls. He undertook to collect leopard scats from caves in the area, and eight scats he provided have been sent for DNA analysis to Dr Carlo Fernandes at the University of Lisbon, who has specialised in faecal DNA analysis of carnivores in Arabia.

Bani Al 'Awwam is situated south of Hajjah city, in a tributary wadi of Wadi Mawr. The mountains around the village are known as Jebel Nimr ('leopard mountain'). Local people said that leopards formerly occurred close to the village but they were no longer sure whether they still occurred in the area. The terrain is very steep and rugged, but villages are situated at low and high elevations including on the ridges, and there is evidence of substantial agricultural expansion, leaving limited unoccupied or undisturbed areas for leopards.

The results of the questionnaire survey indicate leopard presence in two districts in the east of the governorate, adjacent to Wada'a and Shaharah district in Amran. If these reports are all confirmed, there would be a large contiguous area of leopard distribution in the Hajjah-Amran border region of the western mountains.

2.2.3 Al-Mahwit

This governorate lies in the western mountains to the south of Hajjah. Interviews were carried out in Al-Mahwit city and in villages along Wadi Sari'e (which runs north-south towards Jebel Bura'a - below). There were no reports of recent leopard occurrence. The areas visited are quite heavily developed and farmed; the habitat appears sub-optimal at best for leopards.

2.2.4. Jebel Bura'a and Jebel Raymah

These mountains, together with the adjoining Jebel Sherif, form a large mountain block in the western highlands situated between Wadi Surdud on the north, Wadi Rima on the south and Wadi Siham on the east. To the west lies the *tihama* plain. Local reports of leopards have been received by the EPA for several years, but not confirmed. Two short visits were made to Bura'a PA, one to Jebel Raymah and one along Wadi Siham, bordering the mountains to the northeast, to assess the habitat and interview protected area staff and local villagers.

Bura'a PA lies in Hodeida Governorate and covers 4200ha of the lower and mid-slopes of Jebel Bura'a (highest point 2271m). The PA protects the largest surviving remnant of subtropical forest in this part of Yemen. The forest has been traditionally protected by local tribal leaders prior to formal designation as a PA. The terrain overall is extremely rugged, with steep slopes, rocky terrain and dense vegetation that is often nearly impenetrable (Fig. 8) and provides excellent habitat for leopards. A prey base is available in the form of hamadryas baboons (Fig. 9) and rock hyrax (*Procavia capensis*) as well as smaller species. Human settlements are sited on cliff tops high above the forest zone.

The lack of paths and the dense vegetation make surveying for field signs very difficult. Ahmed Hanish, a ranger who has worked in Bura'a for 30 years informed us that he used to see or hear leopards regularly, until the new road through the reserve was constructed. The Director of the PA, Nasser Tahma, said that leopards were still present and he had received one recent report of a sheep killed by a leopard. Several local people interviewed also indicated that leopards are still present with reported sightings in November 2008 and January 2009. Leopards rarely attack livestock in this area and local people do not trap or persecute them. The amount of available leopard habitat is more extensive than the designated protected area and could potentially incorporate the whole Jebel Bura'a massif and adjacent Jebel Sherif. Jebel Raymah contains vestiges of former forest cover but contains many small villages and fields. Elderly residents confirmed that leopards were once present and that none had been seen in the immediate vicinity for 30-40 years, though they conceded that it was possible they still occurred in undisturbed parts of the massif, such as on the SE side where baboons were reported still to occur.



Fig. 8. Bura'a PA

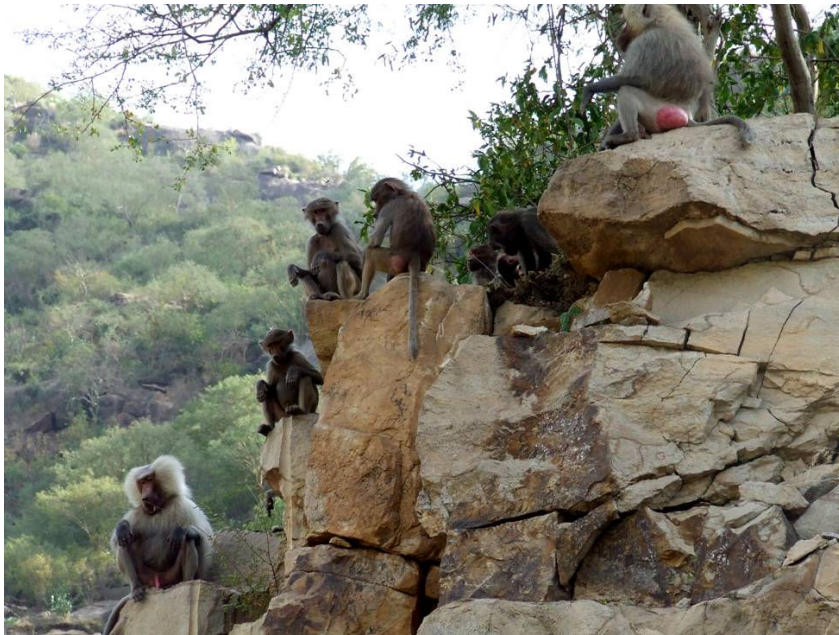


Fig. 9. Hamadryas Baboons (*Papio hamadryas*) in Bura'a PA

2.2.5. Ta'iz

Two visits were made to Ta'iz to assess the status of leopards and the captive breeding programme in Ta'iz Zoo. All the leopards here are descended from individuals wild-caught in Wada'a. They include potentially valuable founder animals that are not part of the international captive breeding programme. The EPA representative in Ta'iz, Jamal Al Bahar, accompanied us on this visit. A meeting was arranged at the zoo with the Director, Assistant Director, Veterinarian, Zoologist and other staff. The zoo currently holds 18 leopards. The last wild-caught animal was obtained in 1999 and the zoo does not intend to acquire further animals from the wild. Record-keeping is efficient and the staff provided the information necessary to update the International Studbook. Positive ways to integrate the Ta'iz leopards into the international captive breeding programme were also discussed.

A follow-up visit in March 2009 was made to meet the new Director. A visit with the zoo's zoologist, Mohammed Ahmed Al-Shawafi, confirmed that 18 leopards were still present, plus five young, born between June and November 2008. One of these was born to the old wild caught female obtained in 1999 and so who is at least 11 years old. The zoo records full details of all births and parentage in its studbook.

The visits also provided an opportunity to follow-up a series of imprecise reports of wild leopards in the Ta'iz area with the EPA representative and zoo staff. Leopards may still occur in the mountains between Al Hamili and Sharab and two leopard skins were recently reported to have been on sale at Mawza. This town is situated at a low elevation on the edge of a desert plain so is unlikely to represent leopard habitat. The EPA and zoo staff undertook to investigate these cases in more detail and a small sum was allocated to enable them to do this.

Six leopards were transferred from Ta'iz Zoo to a private collection in UAE in 2007 (additional to the 18 still present) and negotiations are under way to incorporate these into the international breeding programme.

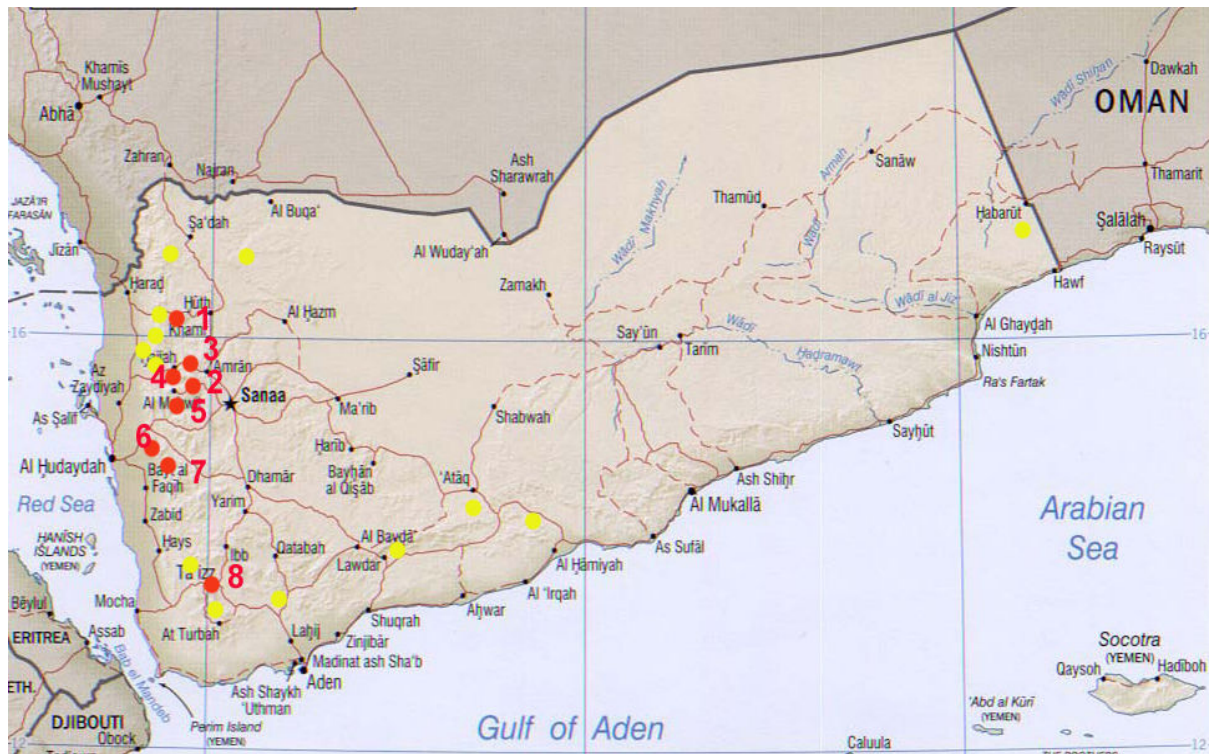


Fig. 10. Yemen. Red dots show field sites visited. 1. Wada'a. 2. Wadi Dhulum. 3. Wadi Sharas. 4. Bani Al 'Awwam. 5. Al Mahwit. 6. Jebel Bura'a. 7. Jebel Raymah. 8. Ta'iz. Yellow dots mark areas with unconfirmed reports of leopards (note: borders shown are approximate and not intended to be authoritative).

2.3. CAPACITY BUILDING (some aspects completed, some in progress)

2.3.1. Field training

Two key persons in the training component of the project were Omer Baeshen (EPA; received initial field training during an earlier conservation project on Nubian Ibex in Yemen in 2005) and Ibrahim Al Shammakh (MSc student, Sana'a University).

Training was provided to these and to all members of the field teams, including EPA staff and local participants. Topics covered included: general field survey techniques, note-taking, local interviews, and identification of leopard tracks and other field signs. Careful attention was paid to differentiating leopard tracks from those made by hyenas, wolves and other canids.

2.3.2. National Survey Strategy

Capacity-building was extended to a more strategic level following the launch of YLRP, its successes in raising the public profile of leopards and the involvement of the Minister. An outline national survey strategy was developed to help coordinate survey efforts by various partners. This was drafted and revised following discussions between this project, YLRP, Sana'a University, the Ministry of Water and Environment/EPA. The latest version, revised in January 2009, is attached as Appendix 1.

A related issue concerned development of a national database to improve the accuracy and reliability of leopard data. Discussions were held with EPA staff on an outline national reporting and mapping system for local, anecdotal and unconfirmed leopard records and ways of prioritizing these for subsequent follow up and field survey. This would include measures to increase information flow through proactive contacts between EPA HQ in Sana'a and all governorates with potential leopard presence and linked to the local informant questionnaires (below). Its use should ensure that all partners work to common definitions and standards.

2.3.3. Questionnaire survey

A simple survey questionnaire for local informants was developed by Dr Abdul Karim Nasher (Dept. of Zoology, Sana'a University) and Ibrahim Al Shammakh (MSc student). Its aim is to garner first order information from local people on current and former leopard presence and takes advantage of the excellent mobile telephone network in Yemen. It is targeted at districts (*mudiriye*) the administrative level below a governorate. The questionnaire asks whether leopards are considered present, date of last confirmed sighting/record/livestock depredation, estimated likelihood of current presence (%) and degree of security in the area. The informant's name and mobile telephone number are recorded and used for follow-up oral interviews. These questionnaires were trialled in Ibrahim Al Shammakh's home governorate of Hajjah. They were initially distributed through students from Hajjah at Sana'a University and a further batch was distributed through the head of science at Hajjah College of Further Education. During the second field trip, completed questionnaires were used to locate local informants to carry out follow-up interviews and rapid field surveys.

Initial results are promising and suggest that the system is very useful in narrowing down areas with recent reports for further survey – an important consideration given the huge scale of potential leopard habitat in Yemen. It is intended to extend the questionnaire survey to all governorates with leopard habitat.

3. OUTCOMES

- Rapid Assessment Survey of Wada'a area
- Rapid field assessments of six other sites
- Development of national survey strategy (Appendix 1)
- Strengthened links between project partners

4. UNEXPECTED RESULTS

The Yemen Leopard Recovery Project (YLRP) that was initiated in the second half of 2007, and independently of the SPF project, introduced a new partner. YLRP's aims include awareness-raising, education and community action as well as field surveys. It has excellent contacts in the government and administration and its activities have met with considerable success in raising awareness of Arabian leopards in Yemen. In particular, lobbying by YLRP led to selection during 2008 of the Arabian leopard as Yemen's national animal, and its use as symbol on a brand of mineral water.

5. CONCLUSIONS

- Wada'a almost certainly retains a leopard population and local people are sympathetic to their conservation (though local problems need to be resolved before further action can be taken)
- Many sites in Yemen (more than previously thought) have local reports of leopards
- All partners remain keen to cooperate on future work
- A national survey strategy provides a sound basis for cooperative action
- The sharp increase in the profile of leopards in Yemen due to YLRP provides an excellent platform for further conservation measures
- The existence of an in-country NGO dedicated to leopard conservation significantly increases the potential for action.
- Local capacity for field survey, GIS, other aspects of conservation are chronically lacking
- The security situation prevents foreign researchers from undertaking field work in some areas (local advice is essential at early stage of field trip planning).

Appendix 1

Yemen Leopard Survey Strategy. January 2009

Background

The principal obstacle to implementation of an effective Yemen Leopard conservation programme is the lack of information on its current status. It is assumed that leopards once occurred widely in Yemen. Surveying the whole country will be a demanding long-term task given the very extensive areas of potential leopard habitat, rugged terrain, logistical difficulties and – in some places - security considerations. It is proposed to adopt a two-strand approach: (a) field and interview surveys in known and suspected sites and (b) systematic local information surveys, coordinated by EPA, of all governorates where leopards could potentially occur. Any positive reports from (b) would be followed up by (a). Conservation measures would then be implemented in all sites where leopard presence is confirmed.

Given the scale of this undertaking, several factors are essential:

- good logistical planning
- co-ordination between all partners/stakeholders (EPA, Ministry, Universities, YRLP, IUCN Cat Specialist Group, others)
- agreed protocols for field survey, data coding and recording.

Aim

To develop a systematic and coordinated approach to assessment of current status and distribution of the Arabian leopard in Yemen.

1. Survey and Monitoring

1.1. Carry out field surveys of areas of potential leopard presence

- 1.1.1. List and prioritise known and probable areas
- 1.1.2. List all other potential sites in the country
- 1.1.3. Develop a logistics plan for surveying these

1.2. Set up a national system for recording and mapping reports of leopards/prey

- 1.2.1. Initiate local information surveys in all Governorates with an EPA office
- 1.2.2. Agree a format for national recording database.

1.3. Agree survey and recording protocols and definitions

1.4. Establish basic monitoring programme for all confirmed and probable populations

- 1.4.1. Wada'a, Bura'a
- 1.4.2. Other sites identified in 1.1.

2. Conservation Action

2.1. Devise flexible approaches to protect leopard populations once presence is confirmed

- 2.1.1. Wada'a
- 2.1.2. Others, as appropriate

3. Education and Awareness

3.1. Launch a national leopard awareness programme (built on its 'national animal' status)

- 3.1.1. Formal education system (schools, colleges, universities)
- 3.1.2. General public
- 3.1.3. National and regional government officials

4. Coordination

- 4.1. Set up a mechanism to coordinate all partner efforts and survey results
 - 4.1.1. EPA and Ministry of Water and Environment
 - 4.1.2. YLRP and other national NGOs
 - 4.1.3. IUCN Cat Specialist Group and other international NGOs

5. Capacity Building

- 5.1. Develop adequate national capacity to ensure long-term project sustainability
 - 5.1.1. Training in field survey and interview techniques
 - 5.1.2. Training in recording, data management, GIS
 - 5.1.3. Training in conservation planning

6. Resourcing

- 6.1 Secure adequate funding for 1-5
 - 6.1.1. Existing funds (Sir Peter Scott Fund, Cat Specialist Group, in-country sources)
 - 6.1.2. Environment Agency – Abu Dhabi Species Fund (from January 2009)
 - 6.1.3. Panthera Foundation - small grants program
 - 6.1.4. Other regional and international donors
 - 6.1.5. Other in-country sources

NOTES

1. Survey and Monitoring

1.1. SURVEY SITES

The following sites have already been identified as worthy of consideration for field survey and others could be added to the list.

Wada'a

Current presence here seems highly likely, based on surveys in December 2007 and early 2008. Urgent priorities here are: (a) re-establish good relations with the local people to develop co-operative monitoring and conservation strategies; (b) extend field surveys to adjoining areas of the wadi system, e.g. Beni Malik on the opposite side, and communities downstream. Relations between tribes in the area are reportedly poor, so a diplomatic approach will be needed. It may be simpler to visit each community separately. Advice from the Governor's office in Amran is clearly required here. **HIGH PRIORITY**

Bura'a/Jebel Raymah

Current presence here seems highly likely, based on surveys in December 2007. Urgent priorities here are (a) follow-up survey of the area, including villages higher up the mountain; (b) provide mobile phone/small allowance to key PA staff to maintain regular communication on reports and sightings; (c) extend survey to whole of J. Bura'a outside the PA. **HIGH PRIORITY**

Mahra Governorate

Adjoins Jebel Qamr in Dhofar (Oman) where leopards are known to occur. Habitat is continuous across the border. Ibex presence reported very recently. Three areas at least to survey: Hawf Forest PA; Jebel Mahra; Wadi Al Jiz. **HIGH PRIORITY**

Jebel Kaur [Abyan]

Obadi reported livestock damage by leopards in the 1980s in Lawdhar area. There are several subsequent reports of continuing leopard presence. **HIGH PRIORITY**

Shaharah

Recent local reports need investigation and confirmation. It is perhaps easier for Yemeni colleagues to survey here? **HIGH PRIORITY**

Eastern and southern Hajjah

Follow-up surveys in Sharas, Wafsa, Kushar and Kufi Shammar districts. **HIGH PRIORITY**

Wadi Mawr system

A huge wadi system that includes Wada'a and Shaharah. A detailed logistic plan is needed to survey this area and its component side-wadis.

Ta'iz area

Some reports from EPA sources in Al Hamili area. Perhaps preferable to ask the local EPA office to carry out preliminary interview surveys.

Wadi Masilah

The lower section of Wadi Hadhramawt; 20+ km of flowing water and no villages.

Wadi Hajjar

Reports from the surrounding hills in 1989.

Yafe'e [Lahej]

Suitable habitats are found in this part of Lahej Governorate and are worth surveying

Sa'ada

Recent reports of leopards from EPA and situated close to areas of recent leopard presence in Saudi Arabia. The current political situation in this area makes surveys impractical at the moment.

1.2. NATIONAL RECORDING SYSTEM

The presence of EPA offices in all governorates offers the possibility of a simple initial process by requiring officials to seek and pass on local information on leopard presence. This data, together with all existing information should be entered onto a national database and mapping system, using GIS if available.

1.3. STANDARDISATION

In order to allow comparability, it is essential that standardised field survey and interview protocols and data codes and categories are developed. For example, to differentiate between 'confirmed', 'reported', and 'possible' records.

2. Conservation Action

Flexible, adaptive management strategies, appropriate to local circumstances will be needed. These may include simple measures such as paying local people as 'leopard wardens' or as regular informants, or more complex whole-village agreements to protect leopards and prey.

- Since the Arabian leopard has been declared "the national animal" for Yemen, laws/bylaws should be established, and leopard protection should be enforced in all potential areas. Here we have to emphasize on the roles of the government/EPA/NGO/International agencies.
- Involve universities in survey, analysis and conservation strategy.



HE Mr Abdurrahman Al-Eryani, Minister of Water and Environment addressing community stakeholders in Wada'a.
(Photo Dr Abdul Karim Nasher)