Conservation Assessment and Management Plan (CAMP)
For
Arabian Carnivores
&
Population and Habitat Viability Assessment (PHVA)
For the
Arabian Leopard and Tahr

A contribution of the IUCN/SSC Conservation Breeding Specialist Group.

Sponsored by the Breeding Centre for Endangered Arabian Wildlife, Sharjah and Emirates Airlines.

Conservation Breeding Specialist Group (SSC/IUCN). 2000. *Conservation Assessment and Management Plan for Arabian Carnivores and Population and Habitat Viability Assessment for the Arabian Leopard and Tahr: Draft Report.* CBSG, Apple Valley, MN.

Additional copies of *Conservation Assessment and Management Plan for Arabian Carnivores and Population and Habitat Viability Assessment for the Arabian Leopard and Tahr: Draft Report* can be ordered through the IUCN/SSC Conservation Breeding Specialist Group, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124.

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March 2000

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP)
FOR
ARABIAN CARNIVORES
&
POPULATION AND HABITAT VIABILITY ASSESSMENT (PHVA)
FOR THE
ARABIAN LEOPARD AND TAHR

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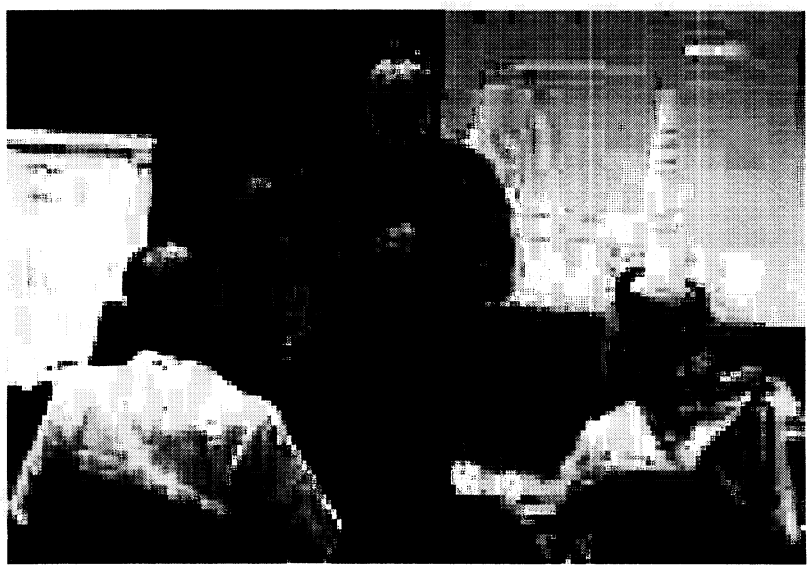
ARABIAN CARNIVORES

&

POPULATION AND HABITAT VIABILITY ASSESSMENT (PHVA)

FOR THE

ARABIAN LEOPARD AND TAHR



SECTION 1

Executive Summary

Executive Summary

The large carnivores of the Arabian peninsula region - leopard, wolf and hyaena - generally have a poor reputation among local communities and the general public. However, there is a widespread impression that they are declining in numbers and the remaining animals are fragmented into small populations. Most of the small carnivores have received little attention and their status is uncertain. The Arabian tahr was of special concern because of its low numbers 25 years ago and the uncertainty about the continued direct impacts of local human populations on the population and its habitat. There are active research groups in each of the countries but there has not been a pooling and synthesis of the new information that has been accumulated in recent years to provide a systematic assessment of the status of these species. Increasing concern about the impact of human populations and shifts in the distribution of some species as well as an increased interest in collaboration between conservation groups in the region provided the motivation to convene a regional workshop to address some of these issues. This workshop was intended to allow researchers and wildlife managers from throughout the region to combine their information and field experience in order to provide an overall regional as well as a country by country review of the status of these species. An invitation was extended to CBSG, which accepted, to assist in this evaluation through the use of its CAMP and PHVA workshop processes. The Arabian leopard and the Arabian tahr were selected for the more intensive single taxon process because of concerns that they are in most urgent need for effective management and conservation action. This report presents the results of these three workshop processes conducted 5-11 February 2000.

Preparation for the workshop began with a planning meeting in Sharjah, 9 December 1999. The workshop was a joint collaboration of the Breeding Centre for Endangered Arabian Wildlife in Sharjah with the Cat Specialist Group and CBSG of the SSC/IUCN. Twelve wildlife experts from the United Arab Emirates, Oman, and Saudi Arabia plus two from the USA, representing CBSG, and a researcher from Germany participated. The one day session served to acquaint this group with the Conservation Breeding Specialist Group of the SSC/IUCN (CBSG) CAMP and PHVA workshop processes and to identify the key issues for carnivore conservation on the Arabian peninsula to be considered in the workshop. A wide range of issues and needs were identified with 48 items in the list. It was agreed that all of the carnivore species known to have occurred on the Arabian peninsula would be included in the review. The status of the leopard and the tahr were considered of urgent concern and in need of a more detailed process of risk assessment and management action so it was agreed to do a PHVA for these species in parallel with the CAMP. Information gathering tasks from each of the countries to prepare for the workshop and the preparation of distribution maps were agreed. This information was to be sent to the Breeding Centre for Endangered Arabian Wildlife in Sharjah for compilation of the briefing book.

The 5-day combined workshops were held 5-11 February 2000 at the Breeding Centre for Endangered Wildlife in Sharjah which provided outstanding logistical support. The Breeding Centre also arranged the financial support for the workshop. The countries and numbers participating included Kingdom of Saudi Arabia (5), Republic of Yemen (3), Sultanate of Oman (5), Bahrain (1), United Arab Emirates: Abu Dhabi (4), Sharjah (15), Dubai (7), Germany (3), Switzerland (1), United Kingdom (1), and the United States (3). The CAMP review included 17 carnivore species and the Arabian tahr. The workshop was opened by our host, Abdul Aziz al Midfa, who participated in the entire process. The workshop was initiated with an overview of CBSG and the CAMP and PHVA process. A brief overview of the Red List criteria from 1994 and the draft criteria of 2000 was given later in the day as part of the information needed to assign a category of threat. Initially two working groups were formed as a result of group discussion: canids plus the hyaena and viverrids; and felids plus the mustelids and including the Arabian tahr. Later in the day the tahr was split off in a separate working group to begin on the PHVA for the species. The felid group agreed to hold consideration of the leopard until the last species in the CAMP process and then to begin the PHVA. During the CAMP workshop the detailed species information was

entered on special data sheets – Taxon Data Sheets – which are included in the report. Information was also entered in the database program for ease of printing the TDS reports and to provide for later analysis.

The PHVA process for the leopard started Thursday morning with an overview of the process and a live demonstration of VORTEX with a computer projector with parameter data being provided by the entire group. This proved to be a stimulating and very intensive review and analysis of the distribution, numbers, and status of the leopard throughout the region. This subspecies is stated to be critically endangered in the region. One of the populations may be of a different subspecies, an issue which needs to be resolved. The status of the tahr appears to be much improved from 25 years ago. It is now estimated to number more than 6,000 up from about 2,000 earlier. A real bonus of the workshop since many people thought it was in more dire straits.

The CAMP review provided evaluations of the 18 species with 2 listed as extinct, 2 listed as critically endangered, 0 as endangered, 6 as vulnerable, 1 as near threatened, 5 as low risk, one as data deficient, and one as not evaluated because likely to be a vagrant with only one record in a border region. Detailed Taxon Data Sheets for reach species as well as species distribution maps are included in Section 6. The leopard was listed a critically endangered and the tahr as vulnerable – an improvement in status for the tahr. Projection of outcome for various scenarios for the Arabian leopard clearly indicated that this species is at high risk for extinction but that this outcome could be drastically altered with specific changes in population management and protection. Specific recommendations for the leopard focused on regional cooperation and collaboration including survey and protection actions, particularly in Yemen, with cooperation from multiple regional organizations and regionally organized international cooperation in a captive management program.

The recommendations were reviewed in detail in plenary session on Friday afternoon with ultimate resolution of all disagreements. Thus the workshop report with its recommendations represents the combined judgment of the participants that they are the best that can be made based upon the available information.

The workshop was closed Friday at 6 PM by our host, Abdul Aziz al Midfa expressing his satisfaction with the dedication and productivity of the participants. He extended an invitation for a second workshop in February of 2001.

Canid Working Group

Top Priorities

1. Yemen is potentially of great importance for a number of carnivore populations, some with highly fragmented or single isolated populations. Relatively low level of development suggests that many habitats may be intact. However, our knowledge of the current status of many of the carnivores is incomplete. Lack of resources in Yemen make it difficult for the relevant authorities to undertake the required survey work. Therefore, regional co-operation is necessary. Survey teams from UAE, Oman and Saudi Arabia should make contact with the Yemeni authorities. Undertaking training and surveys for genet, ratel, Blanford's fox, Arabian wolf, sand fox, striped hyena and bushy-tailed mongoose. This can be accomplished by using cage and camera trapping, questionnaires and search for distinctive sign.

   Organisation: NCWCD (Saudi Arabia); BCEAW (Sharjah, UAE); Oman

   Action: Contact Yemeni authorities and establish joint survey protocols - 2000

2. Although a reasonable amount of survey effort has been directed in the south-western mountains of Saudi Arabia, the mountainous regions in the north-west, and also the central areas, have received relatively little recent attention. Low human populations and relatively intact habitats in these regions may mean that significant populations of carnivores remain. Surveys for genet, wolf, striped hyena, Blanford's fox, sand fox and ratel are to be coordinated for the north-west of Saudi Arabia and undertaken by NCWCD and associates from 2000.

   Organisation: NCWCD (KKWRC/NWRC Saudi Arabia)

   Action: Expand current survey effort into north-western mountains – 2000-2001+

3. Carnivores, particularly larger species such as hyena and wolf, in the region have a poor reputation among local communities, and the general public. They are generally considered as dangerous animals to humans, and responsible for significant livestock losses. Both of these threats are exaggerated. Therefore one of the most critical areas requiring attention within all the countries of the region is public education and awareness. Oman, the various emirates of UAE, Saudi Arabia each have public education programmes, often in association with zoos and other legitimate captive collections. The emphasis to date, however, has been largely on high profile quarry species such as houbara bustard, Arabian oryx and gazelles. A coordinated programme is required which focuses public attention on all of the native carnivores, their ecological role, and a realistic appraisal of the threats they pose.

   Organisation: Government conservation authorities regionally
   NCWCD (Saudi Arabia); ERWDA/BCEAW (UAE); Oman; Yemen

   Action: Production and dissemination of posters and other materials

4. Regular exchange of personnel, and of information on techniques, status and distribution, between the various organisations within the entire region is necessary to avoid duplication of effort and to standardise data.

   Organisation: All

   Action: Newsletter (BCEAW, Sharjah); workshops and joint surveys and training.

Felid/Mongoose Working Group

The threats and management recommendations for the leopard are addressed in the PHVA document.

1. Monitoring

General knowledge of Arabian felids is incomplete. To readdress this monitoring and survey work is strongly recommended within all countries in the Arabian Peninsula. Monitoring via camera trapping, trapping/mark/release, questionnaires for local peoples and active searches for distinctive signs needs to be done. Areas that should be prioritised are protected and planned protected areas.

Yemen has been identified as an important area for research. Information on field methods by a collaborative protocol to carry out this work should be agreed on and shared between all countries of the Arabian Peninsula.

Action: Contact Yemeni authorities and establish joint survey protocols. Newsletter; workshops; joint surveys and training.

Organisation: NCWCD (Saudi Arabia); BCEAW Sharjah (UAE); OMBC (Oman); EPA (Yemen)

2. Public Awareness/Work in local communities

It was thought that general environmental awareness needs to be improved. This includes everything from picking up rubbish to knowledge about the species present. General focus so far has concentrated on charismatic megafauna i.e. leopard and oryx.

Work in local communities includes reducing the human/animal conflict. A pilot study for compensation for leopard kills (and caracal?) is proposed in Rus Al Khaimah.

Action: Government conservation authorities regionally

Organisation: NCWCD (Saudi Arabia); BCEAW Sharjah (UAE); OMBC (Oman); EPA (Yemen)

3. Habitat management

Habitat management is a many facetted and complicated problem. The main focus of habitat management is to sustain such habitat in as good condition so as to maintain a sufficient prey base to support carnivore populations. Creating new protected areas will maintain natural habitats.

Outside protected areas, grazing by domestic livestock is the primary reason for habitat loss. Education in more environmentally friendly techniques is one possible way forward.

Organisation: NCWCD (Saudi Arabia); BCEAW Sharjah (UAE); OMBC (Oman); EPA (Yemen)

4. Captive breeding

Although not the desired approach by some of the group, captive breeding represents a necessary and useful tool for the more endangered felids: Leopard, Cheetah, Caracal, Wildcat, Sand cat.

Captive breeding has an essential role to play in public awareness through education programmes in zoos and wildlife centres.

Organisation: NCWCD (Saudi Arabia); BCEAW Sharjah (UAE); OMBC (Oman); EPA (Yemen)

5. Indian grey mongoose

These are the only species that are increasing their range. It was thought that monitoring and life history studies would be very interesting and useful incase this species had to be eradicated.

Organisation: BCEAW Sharjah (UAE); OMBC (Oman)

Arabian leopard PHVA Report Priorities

Top Priorities

1. Survey & protected area management.

Since the Arabian leopard in Oman is largely within a protected area and is the focus of intensive field study it is not considered a priority for further work at this time. However, records of live capture indicate that Yemen many support significant numbers of leopard. Thus it is considered that Yemen be the focus of short-term wild population management. This will be achieved through surveys for leopard and support for the establishment of a system of protected areas in which the leopard occurs.

Action.

Since at least 9 leopard are known to have been removed from Al Wa'adah area (Yemen) and given that it is a proposed protected area surveys should initially be focused on this area. A programme would begin with ground surveys and be followed by the deployment of camera-traps. If the results of surveys are encouraging efforts should be made to support the responsible authorities in the drafting and implementation of a management plan. A system of training of field and management staff can be undertaken between the various organisations.

Further surveys to be conducted in other areas of Yemen that might support Arabia leopard.

Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OACE (Oman), EPC (Yemen)

2. Captive Management

Develop a Memorandum of Participation for Captive Management of the Arabian Leopard between current holders OMBC (Oman), BC Sharjah (UAE), BC Taif (Saudi Arabia) and BC Ta'iz (Yemen).

Form an Arabian Leopard Captive Management Group comprising of the above holders and experts from the Arabian Leopard Advisory Group. Mr. Abdullaziz al Midfa from AEPA, Sharjah will coordinate the formation of the Captive Management Group, and Dr. Iyad Nader of the KKWRC in Saudi Arabia will coordinate the formation of the Advisory Group with a member from each range country. The Captive Management group would recommend the transfer of animals, suitable pairings to breed etc. in order to maximise the proper genetic and demographic management of the captive population. They would also be responsible for selection of new holding institutions who would then also form part of this captive management group.

The holding institutions participating in the captive management programme should not receive or allow into their collections wild caught Arabian Leopard, except when wild capture is recommended within the terms of the captive breeding programme and as advised by the Arabian Leopard Advisory Group.

The centres participating in the captive management programme should seek to bring into their collections any Arabian Leopard held by individuals or organisation in their own country who are not participating in the Arabian Leopard captive management programme. Centres should not offer payment or any other form of reward in these cases. Note should be taken that where the appropriate legislation is not in place, the centers cannot coerce private holders, merely convince.

Action: Draft the Memorandum and circulate for comment.

Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OMBC (Oman), EPC (Yemen)

3. Trade & hunting

Encourage range states to ratify conventions and to enforce national and international legislation relating to the illegal capture and trade of leopard.

To encourage those states with little wildlife legislation to formulate and encourage implementation of clear hunting laws for each species of carnivore, including penalties set for each species. Also to monitor the enforcement of hunting laws when they are in place. Hunting should be seen as merely the term for the active killing of leopards as a whole, not the sport of hunting, as most leopards are killed to protect the livelihood of stock farmers.

Action:

Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OACE (Oman), EPC (Yemen)

4. Compensation scheme for livestock losses:

Compensation scheme for livestock losses, not including livestock unattended at night (Reference to Discussion: pp 186 – 188, IUCN Cat Action Plan , Nowell and Jackson 1996. A proposal for such a kind of scheme has already been planned by the Arabian Leopard Trust, UAE (R. Lewellyn-Smith, pers. Comm.). Compensation scheme should initially center on the buffer zones of protected areas to have a positive effect on dispersing leopards leaving these areas.
Action: Establish a pilot project within Ras Al Khaimah for compensation payments to shepherds who lose stock to wild leopard. This pilot project will allow for effective mechanisms to be put in place to ensure the success of such schemes within the region.

Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OACE (Oman),EPC (Yemen)

Arabian Tahr (Hemitragus jayakari) Thomas 1894 Summary

Populations of the Arabian tahr have shown themselves to be resilient in a difficult environment. Evidence comes both from recent observations in the field and from simulations using *Vortex* , software, the input being based on the best available knowledge of factors affecting populations of tahr. Best estimates of tahr population from field observations suggest that the total population has risen from 2,000 or so animals in 1978 to about 6,400 in 1998. The increase is due to two factors, first a relief from hunting in key areas and, secondly a reduction in grazing pressure. With increasing affluence pasturalists are reducing their dependence upon goats and the extent of their movements in the middle and upper areas of the mountains have also been reduced making more, and better quality, grazing available for tahr. This optimistic assessment does not apply to the Musendam Governate.

Vortex simulation shows that tahrs are resilient in the face of droughts occurring every four years, which significantly increase mortality and reduce breeding success. Nevertheless the occurrence of additional negative factors such as disease and hunting adversely affect the population and simulations show an increase in unpredictability in the population profile of groups, especially smaller groups. Tahrs seem particularly vulnerable to adverse conditions in which the mortality of young in the first year exceeds 40-45% per annum.

There is anecdotal evidence that small populations of Tahr may be wiped out when discovered by hunters, often at waterholes where water dependent tahr must drink. The impact of these events on the overall tahr population is difficult to assess. It is important that an understanding is reached of the extent to which tahr migrate and elucidate the factors that lead to migration. If migration is widespread then there are implications for disease spread and for inbreeding and genetic diversity, but more important it will determine whether tahr should be managed as a single population or a number of isolated sub-populations.

The main recommendations of the PHVA aim to:

1. Reduce factors which increase tahr mortality, especially mortality in the first year; specifically:
    a. To reduce disease transmission to tahr from domestic stock by ensuring an effective programme of vaccination against the most common diseases in domestic stock living in and around areas occupied by tahr; (Priority 1).

b. To support the ranger forces in Oman and to encourage the establishment of similar forces within the UAE to protect the Arabian tahr for illegal capture, hunting and trade (Priority 2).

2. To enhance our understanding of the species biology and socio-ecology;
   a. By undertaking a study of all factors relating to migration of tahr from one area of mountains to another; (Priority 3)
   b. By undertaking basic research on the biology and ecology of the tahr (Priority3.).

3. To establish an informal group to address administrative and practical matters relating to the exchange of captive animals so that animals are not illegally and incompetently taken from the wild (Priority 5).

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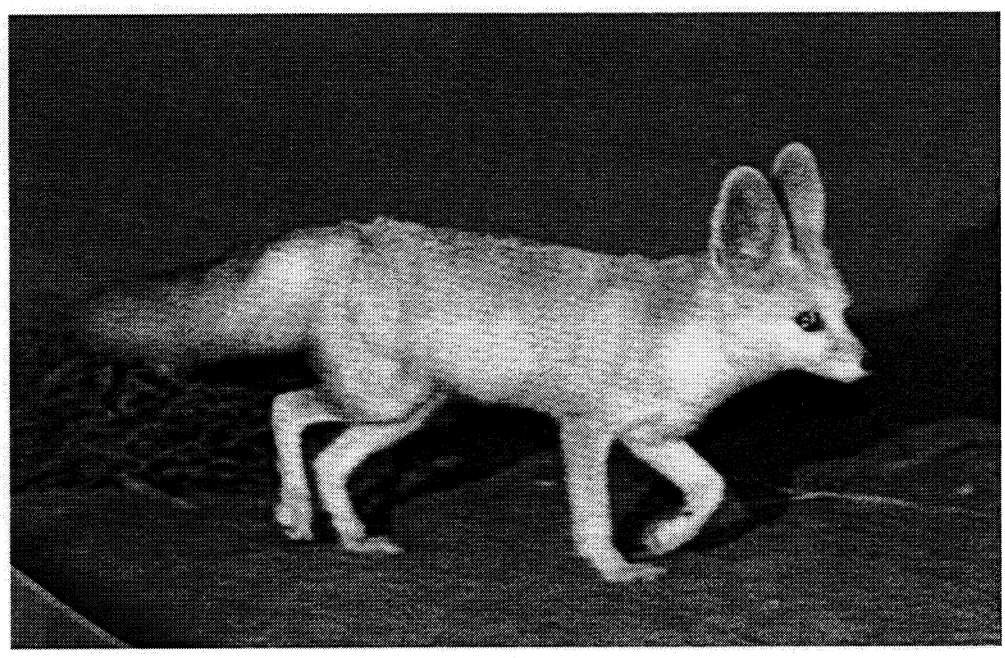

SECTION 2

CANID SPECIES SUMMARY

SPECIES SUMMARIES: Canid Working Group

SPECIES: Genet VU, C1

Genet are apparently restricted to the higher altitude forested areas of south-western Saudi Arabia, and Yemen. Consequently deforestation, due to settlements, wood-cutting, road-building, agriculture and tourist developments are reducing and fragmenting habitat, and most probably reducing populations. Presence-absence surveys, using cage and camera trapping, is needed to assess distribution, particularly in the little studies north-western region of Saudi Arabia, throughout Yemen, and in the Dhofar region of Oman. Once key populations have been identified, more detailed studies of diet and behaviour would be possible. Management should focus on identification and mitigation of causes of deforestation.

- **Supporting research**

Survey

-KSA Cage and camera trapping to determine presence/absence particularly in the north-west
-Yemen & Oman presence or absence from region needs to be determined.

Divided Supporting research into 3 areas

1) KSA: Absence/presence- trapping (camera + traps) – emphasis on western mountains particularly in north.
2) Oman : Absence/presence- trapping (camera + traps) – all areas
3) Yemen : Absence/presence- trapping (camera + traps) – Dhofar emphasis

Life history studies

-KSA Behaviour and diet, on marked populations, e.g. Raydah protected area.

1) Habitat use
2) Diet (Scats)
3) Observation once good populations identified

- **Management recommendations**

Monitoring

To determine persistence in KSA protected areas.
To determine impacts of deforestation

Habitat management/Limiting factor management

KSA (Yemen and Oman) identify causes of deforestation, including die-back (possible climatic change), and re-planting and other programmes.

SPECIES: Asiatic Jackal VU, C1 and D1

Jackal have been confirmed present in good numbers in the Eastern Province of Saudi Arabia, specifically within the Jubail protected area, but little is known of numbers and status in the surrounding areas. There is one record from Al Jouf, in northern Saudi Arabia, from the early 1980s – but nothing more recent despite regional surveys. The focus of attention should be to assess the wider distribution of jackal in the area around the protected area, through night

surveys and spot-lighting. Only secondarily should attention be given to the Al Jouf district. Monitoring should assess persistence of the jackal within the Jubail protected area. Captive collections could be used for public awareness programmes.

- **Supporting research**
  KSA-Determine presence
    - Focus on eastern province
    - Spot lighting
- **Management recommendation**
  Monitoring – Continued presence for Jubail protected area
  Public awareness – Emphasis difference with wolf
  Ex situ breeding – Possibly for public awareness but not currently for KSA collections therefore low priority
  Public awareness - Awareness of Jackal presence in Peninsula

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SPECIES: Honey Badger DD

A widely distributed species in the Peninsula, in mountainous regions, but also steppe desert and vegetated gravel and sandy plains in Saudi Arabia, Yemen and Oman. Presence/absence surveys are required in order to fill in gaps in the distribution records, particularly in north-western and areas of central Saudi Arabia, and throughout Yemen. Such work would improve our understanding of the habitat requirements of ratel in such arid areas. Surveys should aim to identify tracks. Some more detailed studies of diet and range could be conducted on key populations, such as those within the Mahazat as-Sayd protected area (KSA), using radio-telemetry, ear-tagging or implant chip. Information on age/sex structure of key populations would be possible, but reliable trapping techniques are needed as animals enter cage traps in Mahazat as-Sayd only infrequently.

- **Supporting research**
  <u>Survey studies</u>
  KSA – Presence/absence to assess distribution, particularly for western and central regions
  Based on footprints (Need careful identification
  Oman/Yemen – Assess range
  UAE – Follow up on reports to assess if exist
  <u>Life History</u>
  Habitat type based on surveys
  ID key populations
  Trapping and use of chips and traps to assess persistence and age/sex of key populations. E.g. Mahahat as Sayd(KSA)
  Possibility of radio tracking and chips
  <u>Public awareness</u>
  Include in general programmes. E.g. NCWCD, carnivore poster revision

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SPECIES: Blanford's FoxVU, C1 and C2a

A relatively recently discovered species, confirmed to be present in Saudi (south-west), Oman and UAE, in rocky-mountainous areas, with scrubby vegetation. The feeling is that Blanford's fox may be more widely distributed and common than first suspected, and that with more survey work the distribution range will be expanded. It is recommended that cage and camera trapping surveys be expanded, particularly in north-western Saudi Arabia. More detailed work is planned and underway in UAE (Sharjah), involving trapping and sampling, assessment of sub-species, population trends and persistence in key sites. There is a theory that leopards in UAE/Oman may prey on

Blanford's fox, so leopard scat analyses are planned to test this. General surveys are needed in Oman and Yemen to assess distribution – using cage and camera trapping. Blanford's fox readily enter baited cage traps.

- **Supporting research**

Survey studies

KSA(NCWCD) – cage trapping, presence/absence to assess range, particularly western range
UAE(BCEAW) – Cage trapping and camera trapping to assess status and distribution
Blood sampling to assess sub-specific status – also disease survey.
Oman/Yemen – Assess distribution/confirm presence

Taxonomic/Genetic research - Blood sampling to assess sub-specific status – also disease survey.

Life history studies

UAE
Habitat use
Interspecific competition
Based on observations and camera trapping
Leopard scat analysis to determine fox as prey species

- **Management recommendations**

Monitoring

UAE - persistence in areas
- population trends

Public awareness/ ex situ breeding – raise profile

Ex situ management recommendations

Education - raise profile
Research – Reproductive behaviour and parameters

SPECIES: Arabian Wolf VU, C1

Wolves are widely distributed and adaptable species, present in many areas of Saudi Arabia, also Yemen, and some areas of Oman. Wolves are persecuted (shooting, poisoning) and are likely to be in decline, although they are present at least four wildlife protected areas in Saudi Arabia. No accurate population estimates are available. A large scale project to assess distribution in Saudi Arabia was started in 2000, by KKWRC (Thumamah). Making use of questionnaires and search for sign, followed by leghold trapping in key sites (2001), Blood sampling will be done to assess sub-specific status (*arabs* versus *pallipes*). More detailed work on diet and breeding may later be possible. General surveys are needed in Yemen and Oman, to assess distribution and status, perhaps using questionnaire techniques to be developed in the KKWRC study. Captive collections in the region could be used for public awareness programmes; the NCWCD in Saudi Arabia is planning to revise conservation posters for carnivores. Current regional captive collections are to be maintained and should be used for public awareness

- **Supporting research**

Survey studies

KSA – general surveys, questionnaires, field signs (tracks etc) and later trapping and blood samples to assess status and distribution of sub-species
NWRC – compilation of sightings and specimens
Yemen/Oman – Follow-up surveys to assess presence

Life History studies

KSA – Breeding season and productivity; threats and impacts on livestock; i.e. diet studies
Genetic/Taxonomic research – Determination of sub species

- **Management recommendations**
  Monitoring – KSA : Persistence in protected areas
  Translocation – Assess potential to trap in KSA and reintroduce in UAE
  Public Awareness – Address biased public awareness
  KSA – Assess impact on livestock compared with feral dogs
  Establish mechanism to deal with complaints and possible compensation (Co-ord with Ministry of Agric)

- **Ex situ recommendations**
  Education – Ties in with public awareness

SPECIES: Marbled Polecat NE – due to likely vagrant status

This species is represented in the Peninsula by a single live specimen collected in the extreme north of Saudi Arabia in 1990. No subsequent sightings have been made and it is likely that the single specimen represents a vagrant animal on the edge or outside its normal range in Jordan. No follow up work is recommended, apart from compilation of incidental records.

- **No supporting research**

- **Management recommendations**
  Monitoring – KSA – compilation of incidental records

SPECIES: Rueppell's sand fox Regional: nt; UAE only: VU C1

The sand fox is widely distributed throughout the Peninsula, in most habitats, apart from the humid coastal plains. Expansion of settlements may be the greatest threat, particularly in the UAE, where populations are likely to be in decline. The sand fox appears to be in competition with red fox in some areas, with red fox becoming more dominant in association with human development and settlements. The use of very arid areas may mean that sand fox populations in Saudi Arabia are relatively stable. Some detailed studies (mark-recapture; diet; breeding; radio-telemetry) have been conducted in Saudi Arabia, particularly in the Mahazat-as-Sayd protected area, where monitoring is on-going. A survey programme is about to start in UAE (Abu Dhabi, ERWDA), using cage trapping to assess status and threats. In Saudi Arabia the focus is, and has been on assessment of persistence within protected areas. More general survey work is needed outside protected areas in Saudi. Sand foxes readily enter cage traps, and are easily recognised during spot-light surveys. Existing captive collections in UAE should be maintained for ongoing public awareness.

- **Supporting Research**
  Survey: -KSA (NCWCD)
  - Focus on protected areas.
  - Cage trapping ongoing.

  -UAE (ERWDA)
  - General surveys to assess distribution (2001)

Life History studies

-KSA (NCWCD)

- Recovery of populations after rabies. Ongoing programme in Maharat as-Sayd (1996-2001).
- Competition with red fox.

-UAE (ERWDA)

- Virology and pesticide accumulation. Trapping and sampling (2000-2001).
- Studies and threats to population. (2000 -)

- **Management recommendations**

Monitoring

-KSA Persistence in protected areas.

-UAE Status in Abu Dhabi

Captive breeding

-Maintain captive bred collections in UAE for public awareness and education.

SPECIES: Red fox LR, lc

An adaptable and extremely widely distributed species, that thrives both in arid wild areas, more mesic mountainous habitats, around human settlements, but probably not in extreme arid areas, such as the sand seas, where the more arid-adapted sand fox may dominate. Increasing human developent may be benefiting the species, which is widely regarded as a pest, but despite intense persecution persists in good numbers.

No supporting research or management recommendations made

SPECIES: Fennec foxEW (possibly EX, depending on subspecific status)

The species is known on the Peninsula only from a collected specimen from Kuwait in 1932. It is not believed to present currently, and there is the possibility that the Kuwait specimen originated from elsewhere. No specific field work is recommended, apart from maintaining awareness of the possibility of Fennec in sandy regions of peninsula, in conjunction with sand fox surveys.

SPECIES: Striped Hyaena VU, C1

Widely distributed in Saudi Arabia, Yemen, and Oman, in a variety of habitats, including mountainous, rocky, and steppe desert areas, but largely absent from open plains. As with wolves, hyena are persecuted (shooting and poisoning) and populations are believed to be in decline. General surveys are needed, particularly in north-western and central northern Saudi Arabia, Yemen and Oman. Survey work in Saudi Arabia is planned for 2000-2001 (KKWRC and University of Rome), using questionnaires, spot-lighting and camera trapping. It is suggested here that KKWRC co-ordinate the collection of tissue samples from the incidental specimens throughout the region, for analysis of subspecies and population isolation at the KKWRC cytogenetics laboratory – a protocol is to be formulated in 2000. A new conservation poster is being prepared for striped hyena by NCWCD in conjunction with the IUCN/SSC Hyena Specialist Group. Current regional captive collection are to be maintained and should be used for public awareness.

- **Supporting Research**

  Survey

  -KSACamera trapping and spot lighting to determine presence/absence particularly in the north-west and central areas.

  -Yemen & Oman presence or absence from region needs to be determined.

  Taxonomic research

  -KSA (KKWRC) Incidental sample collection from peninsula for genetic analysis. To prepare a protocol for sample collection regionally.

  Life history studies

  -KSA Social structure, range and diet. Possibly through radio tracking in the south-west.

- **Management recommendations**

  Monitoring To determine persistence in KSA protected areas.

  To determine impacts on livestock

  Public awareness

  KSA (NCWCD) Poster and campaign, current revision underway in conjunction with Hyaena Specialist group.

Captive breeding

Maintain current collections for education purposes.

SPECIES: Bushy-tailed mongoose CR, C2b

Known only from live specimens collected and recorded in the last 15 years around Sanaa, Yemen. Little is known of the status or possible wider distribution of the species in Yemen. Surveys in Yemen are required. The population is believed to be isolated and with few (<250) mature individuals.

- **Supporting research**

  Survey Yemen: Cage trapping throughout Yemen to assess distribution and estimate population size range. Should a significant population be located, life history studies possible.

- **Management recommendations**

  Monitoring Yemen: monitor persistence through periodic cage trapping.

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP)
FOR
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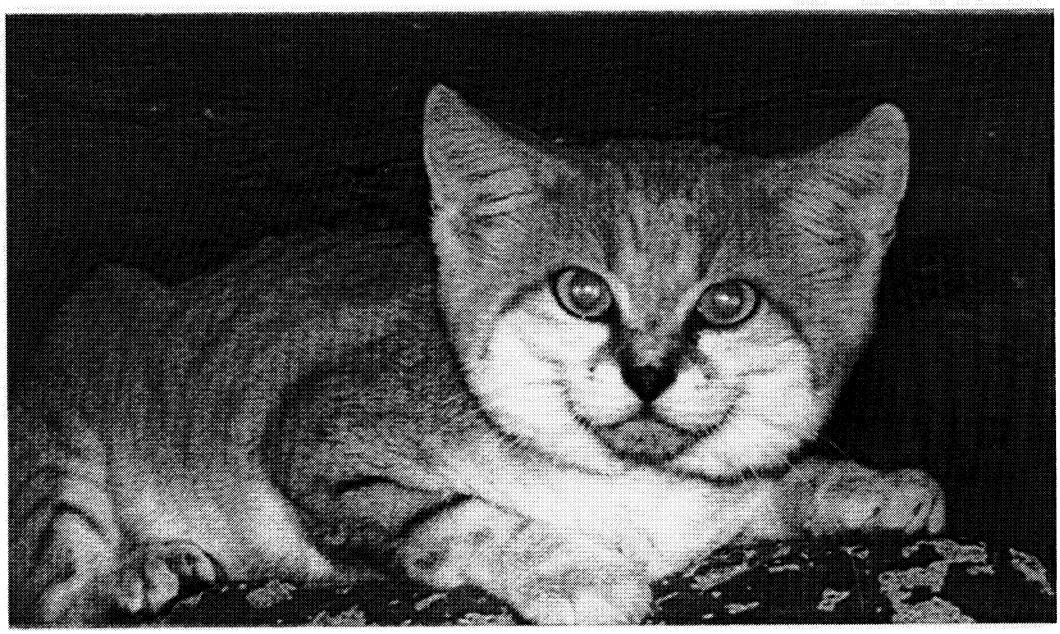
&
POPULATION AND HABITAT VIABILITY ASSESSMENT (PHVA)
FOR THE
ARABIAN LEOPARD AND TAHR



SECTION 3

FELID SPECIES SUMMARY

INDIVIDUAL SPECIES ASSESSMENT:
FELID/MONGOOSE WORKING GROUP

Caracal lynx *Caracal caracal schmitzi* (Matschie, 1912)

IUCN CATEGORY: LR NT

Criteria:

Discussions of this subspecies evolved around it being a very robust animal despite its continuous persecution. Debates occurred as to whether this species was hunted as a result of direct stock losses or as vermin.

Habitat quality and habitat area was another topic for discussion. It was thought that the Caracal may still exist in areas where it is heavily persecuted (where the human/animal conflict is at its greatest). There were accounts from Oman that it may be moving into leopard territory as the leopard declines in Northern Oman. It was concluded that although this resilient hunter was being persecuted there is no confirmed decline, based on records. However, the overall gut feeling was that the population is in general decline.

There appears to be an opportunistic trade in Caracal for pets. An anecdotal reference was made to people keeping them in private collections and/or as pets. Data is insufficient to count this as a major threat.

Although there is an International Studbook for the Caracal (The Living Desert), a regional studbook/ register should be set up involving private collections. There is no problem breeding this species internationally, but there appears to be a problem breeding them regionally. The idea of this register/studbook is to increase the management, not necessarily the captive numbers.

Management recommendations were listed (in order or priority) as follows:

1. Monitoring
2. Public awareness
3. Habitat management
4. Work in local communities
5. Captive breeding

Supporting research.

Survey

A survey in all listed leopard habitats is important as this species might serve as an indicator for declining leopard populations.

In areas not used by leopard in recent historic times the caracal would have been an apex predator, and its continued presence is an indicator of an ecosystems health.

Life history studies

The home ranges of caracal are not well researched in Arabia, particularly in mountain habitat. The prey basis has not been identified, particularly whether or not the caracal can survive on a diet consisting of small rodents and birds only.

Taxonomic

Distinguish which sub-species is in Arabia, and whether or not the 3 subspecies in the greater Asian/North African region should keep this status.

Management recommendations.

Monitoring

Phototrapping in wadis, and collection of scat samples for analysis of prey base.

Habitat management

The gravel plains which would be ideal habitat, are being reduced in quality due to human settlement and quarrying.

Public Awareness

Education for ecological awareness, that in an intact ecosystem, natural prey would prevent caracal from turning to kill livestock.

Work in local communities

Management of small livestock in caracal habitat to prevent stock losses.

Captive breeding

For environmental education programmes to improve the image of the caracal locally.

Cheetah *Acinonyx jubatus* (Schreber, 1776)

IUCN category: EX

Criterion: No record since 1977

The last records for the cheetah in Arabia were from 1952 in Saudi Arabia on the Iraqi border, and 1977 in Oman near the Yemen border, where a skin was found. The latter is a doubtful record, as the exact origins of the skin was not known. They are now extinct in Arabia, although large amounts of suitable habitat still exists in Arabia, particularly in protected or remote areas. Preferred habitat would have been gravel plains, and semi-desert, basically any level area which supported gazelle populations. Our first question was which subspecies of cheetah occurred in the Arabian Peninsula? It was a topic that was repeated through out the data sheet, even though we had decided to look at the species as a whole in the Arabian Peninsula.

Sean McKeown thought that the African species was more probable due to mountain ranges between Iran and Iraq forming a formidable barrier. He did point out that cheetahs may have come across the gulf before plate movement separated Iran from Arabia, so therefore the Asian cheetah as the origin cannot be discounted.

If the species was African, then which subpopulation? It was suggested that it would be the North African cheetah that was here, originated possibly from Egypt, Sudan, Ethiopia and Somalia. However the classical range of the North African race, according to the IUCN, does not recognise Sudan, Ethiopia and Somalia as N Africa, only those countries bordering the Mediterranean. Their thought was that mountains in Ethiopia would form a barrier to migration Southwards into Somalia. It is possible that due to the prey species being found in a continuous strip down the coast, from the Mediterranean, that this would have created a corridor that the cheetah could follow.

The question as to which subspecies is found here is being deciphered by Steven O'Brien, at the Centre for Genome Studies.

The group decided to answer questions on habitat with a view to possible reintroduction. It was decided that there was 'good cheetah habitat' in protected areas in Oman and Saudi. However, it was also agreed that even in protected areas, the suitable habitat was decreasing. Prey base, interspecific competition, and fragmented populations were all discussed thoroughly as threats to developed a sel- sustaining population in Arabia. It was generally concluded that ecologically, reintroduction of the cheetah was possible in places, but politically, reintroduction is a long way off. If reintroduction was to occur, it would result in small, fragmented, intensively managed populations. Threats were based on our hypothetical population both in and outside reserves. Although the prerequisite for reintroduction is for hunting to be stopped altogether, it was still seen as an important threat. Road kills was put in as Peter Jackson had evidence from Iran that a Cheetah had been killed by a car.

Predation on cubs was attributed to Wolves, Hyaena, and feral dogs. Interspecific problems will always s be a threat in reintroducing large carnivores.

The most important threat to the present wild populations is trade in live animals, namely 4-8 week old cubs. A huge number come into the UAE alone. The price of a cheetah cub has decreased from about 40,000 Dirhams to 8,000 Dirhams (heresay, not referenced) in the past 15 or so years. Information at our disposal indicates that the animals that feed the UAE market

come in from Sudan and Somalia. The UAE is not considered the worst culprit within the region. There does not appear to be a trade in cheetah parts.

Supporting Research.

Survey studies

Identify possible remaining habitat, of suitable size for reintroduction.
Genetic research

The determination of the relationship between the extinct Arabian population of cheetah and the African and Asian populations should be determined from museum material. This has particular significance in light of consideration of potential programs which have been discussed for the release of cheetah back on to the Arabian peninsula. Groups of animals which have the largest genetic variability are the most suitable for reintroduction. In addition, this will determine whether possible release programs would be "reintroduction" programs or "introduction" programs.

Life history

The responses of the introduced cheetah to their new habitat will indicate the long term success rate.

Management recommendations

Habitat management

A suitable prey base, such as gazelle will be needed and the habitat managed accordingly.

Monitoring

The habitat will need to be monitored to ensure it is at its fullest potential for optimal increase of the introduced animals.

Work in local communities

Communities around the protected areas will have fears of stock losses and danger to children, and they need to be informed about how they will be protected from these perceived threats.

Public awareness

The support of the programme will depend on a well informed public who see the benefits of returning cheetah to the landscape.

Captive breeding

A captive breeding programme will supplement the animals released.

Indian grey mongoose *Herpestes edwardsi* (Blanford, 1874)

IUCN category: LR lc

Criteria: No reason for higher conservation status

The general consensus was that the Indian Grey Mongoose is anthropophilic. It is probably an exotic spp invading from Iran. Harrison has the first records for this species on the peninsula from Qatar, the first record iin the UAE is 1975. It was agreed that there were no Indian Grey Mongoose in Arabia 100 years ago. Insufficient data meant that the group could not decide whether this species was actually helped by man or used man to migrate. As there is a trade in Indian Grey Mongoose, it is thought to be a bit of both.

At the moment, this mongoose is found in settlements bordering the Gulf. It is not so prolific that they are considered vermin, or even so you see them regularly. How far, and how fast this species is spreading is unknown and would be a very interesting and useful research project.

Given the species is very prolific, dynamic and tolerable, threats that would occur would not make a significant impact on the species.

Supporting Research.

Survey studies

The rate of spread of this species is important to predict its occurrence into Oman and other areas where it does not presently occur. Although it has not been found in natural habitat, constant surveys will allow us to identify this potential risk timeously.

Life history

Radio tracking and mark-recapture projects will allow us gauge the species resilience close and away from human settlements.

Management recommendations

Wild population management

Look at methods of control if they become a truly invasive and destructive species.

Monitoring

Monitoring through mark recapture will indicate the preferred habitat and environmental conditions which favour this species. We also need to identify if any invertebrate or reptile species are at risk due to predation from this mongoose.

Public awareness

Educate that this is an invasive species, and so that it is not helped to spread even further through the pet trade.

Arabian Leopard *Pathera pardus nimr* (Linnaeus, 1758)

IUCN CATEGORY: CE C1

Criteria: Population less than 250 mature individuals.

The Arabian Leopard will be difficult to save and manage even if it is only one sub-species. If two are recognised on Peninsula then at least one will be most likely to become extinct. The leopard Nimr at the BCEAW has poor records since capture and before transfer to Sharjah. Some people are doubtful whether or not it is a true Arabian Leopard, or brought into captivity from outside the region. Some people in the group do not want this leopard recognised in the studbook. The sub-species debate is still not resolved, and ongoing genetic research by Steve O'Brien might provide some answers.
Would have occurred in savannah areas before displaced by human activities. Did they occur in juniper forests? Do they still occur here? There are 3 to 4 sub-populations listed, but are they truly separated, or limited in terms of genetic transfer?
Has the prey size determined the size of the leopard? Need to establish the natural prey base for this animal, to enable better habitat management. Porcupine noted to be eaten by leopard in Palestine and Baluchistan, not preffered prey in Africa. Is this a marginal prey species which is targeted due to decline in preferred species? Without direct persecution, this animal could survive around human settlement. The fat from the leopard is used in traditional medicine in KSA. There is a report of a $5000 reward offered in UAE for capture of live leopard (illegally of course).
Whilst everybody recognised that genetic problems was a definite threat, it was not a primary threat to the population, except in an indirect manner, as each of the other perceived threats would have a greater impact on the survival of the sub-species, i.e. would be intensified, because of a reduced genetic pool.

The number of mature animals was calculated on the basis that it is thought that as soon as they are sexually mature, they become reproductively active, because there is more available habitat than there are leopards, and therefore to reduced competition they could breed earlier.

There is no legislation officially protecting the leopard in Arabia, except for Oman. This needs to be addressed urgently, and the legislation once passed must be strictly enforced. There needs to

be a captive breeding cooperation programme with all centres holding these animals. A regional breeding recommendation approved by a steering community can be implemented, with full exchange of animals to the best benefit for the sub-species.

The threats are (in order of severity):

1 Hunting
2 Trade For Market Or Medicine
3 Decline in prey species
4 Poisoning
5 Loss of Habitat
6 Grazing (loss of coastal forest)
7 Habitat Fragmentation
8 Genetic problems
9 Drought

The management priorities are as follows (in ranking order):

1 Limiting factor management (hunting)
2 Public awareness
3 Address policy makers ref needs of local people
4 Monitoring
5 Work in local communities
6 Wild population management
7 Captive breeding
8 Habitat management
9 Genome Resource
10 Translocation

Supporting Research.

Genetic research

There is a high potential for inbreeding in captive animals, and this factor will severely limit the breeding success of this population. There are also indications of inbreeding in the wild population, and this needs to be qualified to assess the risk of stochastic extinction.

Survey studies

Due to its secretive nature the leopard may still exist in areas of potential habitat where it has not been recorded. A complete survey of all areas, especially KSA and Yemen is critical to make an accurate assessment of the wild population. This can be achieved best through photo trapping using experienced personnel from Oman or Sharjah. Scat samples are also a reliable indicator. A grid system of likely habitat needs to be compiled and surveys coordinated regionally.

Limiting factor research

The killing of leopards in retaliation for livestock losses has been identified as a primary threat to the sub-species. Research into actual losses and how to limit this would ease the pressure of persecution.

Taxonomic research

Morphological and genetic studies will make the position of the sub-species clear, to allow for the most effective and informed management of the populations, both wild and captive.

Epidemiology

This is an animal which is critically endangered through small numbers and fragmented populations. The other limiting factors make any disease event a possible extinction event. Research into possible diseases of epidemic proportions is thus vital.

Life history

Only incidental records exist for this animal and more complex studies are necessary to develop any form of effective management. Home ranges, territoriality, prey selection, social structure and response to human encroachment are only the basics that need to be researched urgently. There are particular areas easily identified as having the least information available, such as Yemen and parts of KSA.

Trade

As most killing is done as direct retribution for stock losses, it is difficult to state the effect of trade, although it is reported from Yemen that villagers now make active efforts to live trap leopards, possibly to supplement income. There is a further report of a reward offered for live capture in the UAE.

Management recommendations.

Limiting factor management (hunting)

Effective legislation which is rigorously enforced, combined with sympathetic approaches to stock losses, including possible compensation for such losses is urgently required to prevent any more killing of leopards.

Public awareness

Leopards have generated a fair amount of public interest, and this must be fostered and developed to change the public perception of this predator, and how threatened it really is. In particular work done by field workers such as from the ALT in local affected communities is

critical. The example of the extinct cheetah in Arabia can serve as an example of how easily this can happen,even to a flagship species, and how irreversible such an extinction is.

Address policy makers ref needs of local people

Again, any concerns from people living in leopard areas, and stock farmers must be addressed, and any possible revenue gained from eco-tourism channeled back to local communities.

Monitoring

Camera trapping, scat collection and use of local interviews can allow for effective monitoring outside of field studies.

Work in local communities

As per Public Awareness, plus a programme of training effective rangers from local communities.

Wild population management

Creation of corridors between identified fragmented populations. Establishment of protected areas.

Captive breeding

To preserve live genome, for education and for possible reintroduction, this programme must be intesified and coordinated throughout the region. A priority is to get the captive potential founders breeding.

Habitat management

Restricting livestock grazing will allow for a increasing natural prey base, which is only achievable through a system of protected areas.

Genome Resource

Any captive animals unable to breed naturally should be incorporated into the existing Assisted Reproductive Programme in cooperation with Henry Doorly Zoo, Omaha, Nebraska.

Translocation

This was identified as an option to be considered with a well researched and managed population, to prevent the risk of losing translocated animals.

Sandcat *Felis margarita harrisoni* (Hemmer, Grubb and Groves, 1976)

IUCN category: LR lc

Criteria: Does not merit any higher conservation status

This cat is adapted for a specific habitat, which is the true sand desert, where it is able to out compete all other small carnivores. Despite this it is also recorded from other areas, which can be regarded as marginal habitat for this species, because of interspecific competition. As it is so specific, it is vulnerable to disturbances.

Despite this there is no evidence to support any rate of decline, except possibly for Oman, where there are no recent sightings, even in prime undisturbed habitat.

Management priorities are as follows (in ranking order):

1. Monitoring
2. Public awareness
3. Habitat management
4. Work in local communities
5. Captive breeding

Supporting research.

Survey

- To determine the true distribution within potential habitat within Oman such as the Wahiba Sands, using cage trapping.
- In an area of unknown distribution, to test the nature of the true distribution, to test whether or not it is contiguous. Mahazat as-Sayd, KSA.

Life history studies

Determine home ranges in differing habitats, such as gravel plains, sand dunes. A suitable area for this research would be Mahazat as-Sayd, KSA.

Management recommendations.

Monitoring

CAPTURE AND MARK INDIVIDUALS TO DETERMINE POPULATION RANGES AND SIZES

Public awareness

Inform people that desert driving is destroying the habitat for this cat

Habitat management

Restrict overgrazing and driving off established tracks.

Work in local communities

Educate local communities on better stock management to prevent over-grazing

Captive breeding

Maintain a small population to study life history and for education

White tailed mongoose *Ichneumia albicauda albicauda* (Cuvier, 1829)

IUCN category: LR lc

Criteria: No reason for higher conservation status

Extraction of fossil water is possibly lowering the permanent water table and thus altering vegetation and mongoose habitat. All suitable current habitat needs to be surveyed on a regular basis to quantify population changes, and changes in habitat quality noted.

Water management plan for region needs to be established on country basis to reduce this serious impact. These effects would be accelerated and amplified during extended drought periods.

Supporting Research.

Survey studies

Mark-recapture and cage trapping over time will allow us to estimate population trends, particularly in areas with reducing water tables.

Life history

The prey base is not known, and is important in assessing habitat quality. Also it is assumed to be able to out-compete encroaching populations of Indian grey mongoose, but their sensitivity to this scenario needs to be researched. The range size and social structure is also important in assessing population health.

Management recommendations

Habitat management

Control of fossil water extraction is essential to retain the required wet habitat of this animal.

Monitoring

Long term monitoring is the only method of assessment, as incidental records will not indicate any changes over time.

Public awareness

General education as to recreational usage of wadi habitats to stop pollution of permanent water sources.

Arabian Wildcat *Felis silvestris* (Schreber, 1775)

IUCN category: LR lc

Criteria: Does not merit any higher conservation status

The group decided to discuss the wildcat in Arabia as a group in the whole peninsula since there is considerable disagreement on the sub-species status in the region. Whether or not *gordoni, tristrami* and *iraki* are distinct is a matter which is currently under review between NWRC in KSA and the BCEAW, Sharjah in the UAE.

This animal is a generalist in terms of habitat, with elevation records of 1800m in Oman. Although there have been a considerable number of human interferences, there is no data to report on whether or not these influences have positively or negatively affected its numbers and distribution.

The captive breeding programme has considerable inbreeding problems, and needs new founders to survive, but this cat is not largely desirable in international zoos, and indications are that there is no need to breed for reintroduction. This was a cause for some concern amongst group members. The highest risk was identified as hybridisation with ever increasing populations of feral cats.

The priorities for management are (in order of ranking):

1. Monitoring
2. Habitat Management
3. Public Awareness
4. Work in Local Communities

5. Limiting factor management
6. Captive breeding.

Supporting research.

Survey

Survey in little known areas of Oman to determine distribution status. Intitial trapping surveys in the UAE (BCEAW) and KSA (NWRC) have indicated that the wildcat is more widespread and common than generally accepted.

Life species studies

Continuing research in Sharjah using radio-tracking, which is providing useful data on home ranges. Further studies should be undertaken in the Yemen, in differing habitat.

Genetic

Determine levels of in-breeding and hybridisation in all populations, to assess the effects on wildcat populations.

Taxonomic

Research has been initiated in the United Arab Emirates, the Kingdom of Saudi Arabia and Oman to carry out morphological studies on all live and dead animals. Samples have been taken from these animals for later genetic testing.

Management recommendations.

Monitoring

DENSITY AND DISTRIBUTION IN THE UAE, OMAN, KSA AND YEMEN

Habitat management

Restrict overgrazing in all areas of distribution.

Public Awareness

Stress danger of hybridization with feral cats to locals to discourage the spread of feral cats.

Limiting factor management (hybrids)

Identify and eliminate hybrids and control the spread of feral cats.

Captive breeding

Increase the founder base and ensure a minimum of more than 50 healthy captive pairs.

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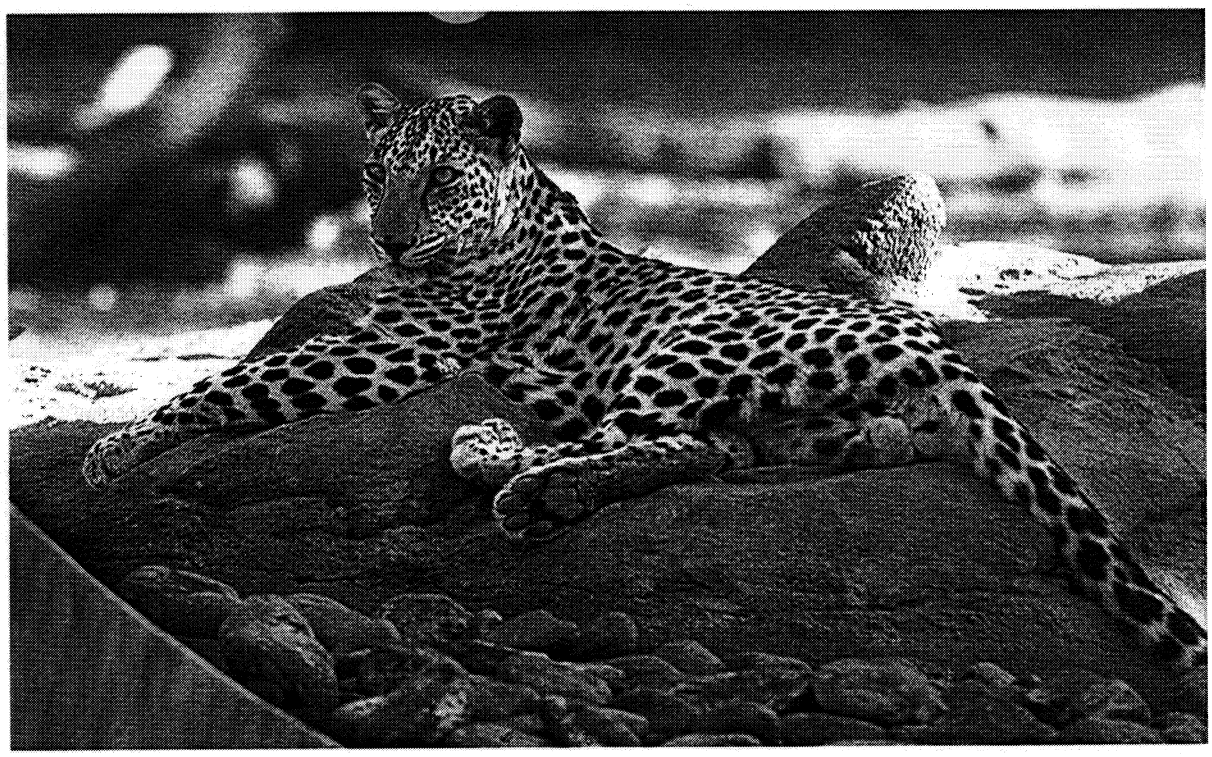


SECTION 4

LEOPARD PHVA REPORT

PHVA Working Group: Arabian leopard.

TOP PRIORITIES

1. Survey & protected area management.

Since the Arabian leopard in Oman is largely within a protected area and is the focus of intensive field study it is not considered a priority for further work at this time. However, records of live capture indicate that Yemen many support significant numbers of leopard. Thus it is considered that Yemen be the focus of short-term wild population management. This will be achieved through surveys for leopard and support for the establishment of a system of protected areas in which the leopard occurs.

Action:
Since at least 9 leopard are known to have been removed from Al Wa'adah area (Yemen) and given that it is a proposed protected area surveys should initially be focused on this area. A programme would begin with ground surveys and be followed by the deployment of camera-traps. If the results of surveys are encouraging efforts should be made to support the responsible authorities in the drafting and implementation of a management plan. A system of training of field and management staff can be undertaken between the various organisations.

Further surveys to be conducted in other areas of Yemen that might support Arabia leopard.

Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OACE (Oman), EPC (Yemen)

2. Captive Management

Develop a Memorandum of Participation for Captive Management of the Arabian Leopard between current holders OMBC (Oman), BC Sharjah (UAE), BC Taif (Saudi Arabia) and BC Ta'iz (Yemen).

Form an Arabian Leopard Captive Management Group comprising of the above holders and experts from the Arabian Leopard Advisory Group. Mr. Abdullaziz al Midfa from AEPA, Sharjah will coordinate the formation of the Captive Management Group, and Dr. Iyad Nader of the KKWRC in Saudi Arabia will coordinate the formation of the Advisory Group with a member from each range country. The Captive Management group would recommend the transfer of animals, suitable pairings to breed etc. in order to maximise the proper genetic and demographic management of the captive population. They would also be responsible for selection of new holding institutions who would then also form part of this captive management group.

The holding institutions participating in the captive management programme should not receive or allow into their collections wild caught Arabian Leopard, except when wild capture is recommended within the terms of the captive breeding programme and as advised by the Arabian Leopard Advisory Group.

The centres participating in the captive management programme should seek to bring into their collections any Arabian Leopard held by individuals or organisation in their own country who are not participating in the Arabian Leopard captive management programme. Centres should not offer payment or any other form of reward in these cases. Note should be taken that where the appropriate legislation is not in place, the centers cannot coerce private holders, merely convince.

Action:
Draft the Memorandum and circulate for comment.

Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OMBC (Oman), EPC (Yemen)

3. Trade & hunting

Encourage range states to ratify conventions and to enforce national and international legislation relating to the illegal capture and trade of leopard.

To encourage those states with little wildlife legislation to formulate and encourage implementation of clear hunting laws for each species of carnivore, including penalties set for each species. Also to monitor the enforcement of hunting laws when they are in place. Hunting should be seen as merely the term for the active killing of leopards as a whole, not the sport of hunting, as most leopards are killed to protect the livelihood of stock farmers.

Action:
Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OACE (Oman), EPC (Yemen)

4. Compensation scheme for livestock losses:

Compensation scheme for livestock losses, not including livestock unattended at night (Reference to Discussion: pp 186 – 188, IUCN Cat Action Plan , Nowell and Jackson 1996. A proposal for such a kind of scheme has already been planned by the Arabian Leopard Trust, UAE (R. Lewellyn-Smith, pers. Comm.). Compensation scheme should initially center on the buffer zones of protected areas to have a positive effect on dispersing leopards leaving these areas.
Action: Establish a pilot project within Ras Al Khaimah for compensation payments to shepherds who lose stock to wild leopard. This pilot project will allow for effective mechanisms to be put in place to ensure the success of such schemes within the region.

Organisation: NCWCD (Saudi Arabia): BCEAW (Sharjah, UAE), OACE (Oman),EPC (Yemen)

DISCUSSIONS FOR THE PHVA PROCESS.

INDICATIONS OF THE PRESENCE OF THE ARABIAN LEOPARD

The discussion as ever started with the possibility of the 'Northern' leopard being significantly genetically different to the 'southern' leopard. The fact that this is based on one leopard of disputable origin is not enough (later discussion clarified the origin of this leopard, but not to the satisfaction of the whole group). It was later deduced that an estimate of 5-10 leopards may possibly be found in 'northern' region. The 'northern' region was clarified as N Oman (including the Musandam) and the Northern Emirates. This is not a viable population in itself.

On data authenticity it was noted that locals were reported seeing 'nimr' and they count any large cat and large canid as 'nimr'. Kills have not been noted as 'sightings' due to no notes. The point was raised that a carcass had been seen, which is thought was leopard and large felid tracks were found nearby. This was in the Hatta region.

It was generally concluded that the leopard occurs only in mountainous regions due to persecution, not choice. When discussing contiguous populations it was questioned whether leopard would use more sandy habitats as corridors. This was specifically in reference to the possible corridor between the 'northern' sub-population and the Dhofar sub-population. The area along the coast is low lying wadi's (<50m). This area is lightly populated and thought that it was unlikely that leopards used this as a corridor even though the leopard is highly adaptable (compared with the migration of the Bengal tiger for instance). Potential habitat for the leopard is high, and given the Arabian Peninsula was generally inhospitable to people, historically the leopard must have had a wide range and dense population. Figures from kills appear to reflect this: Northern Oman - 11 reported in 1979-80, 2 in 1997; Saudi - 15 in the last 20 years; UAE and Musandam - 9 between 1960 and 1994. Please note that these are ESTIMATES not accurate figures.

YEMEN

It was thought Extinct in Yemen until 1994 when a local person trapped a leopard and notified the EPC. Due to the difficult terrain it was difficult to keep track, especially as locals would trap/kill leopards without notifying the authorities.

This leopard was caught in an area of rugged mountains, in a large wadi that extends from near Sana to the Red Sea. Since then 9 leopards have come out of this area. Hyrax and feral livestock (no records of livestock being taken) are the prey base. It is proposed to make this area protected. There is historical data for the area in east Yemen, bordering Oman, but there are no recent records.

The Yemeni government is proposing 11 more protected areas.

SAUDI

Sighting of a female and 2 cubs was made in 1997 near Ta'if. In 1999 intensive research was requested and made a tentative study was made using camera traps and talking to locals who made the above, and other recent sightings.

OMAN

In the Dhofar area (Jebel Samhan Sanctuary) 14 individuals have been caught on camera traps. 8-9 of these are 'trapped' regularly. This area is protected and It is possible that there are still leopards in the Jebels to the west of Dhofar as these harsh Jebels are lush with wooded wadi's. No census has been carried out, and little has been reported.

It is thought that there are no leopards in the northern mountain area, although the area appears to be suitable leopard habitat.

The major decline in Oman occurred in the 1970s.The availability of guns increased. Certainly the introduction of the .22 contributed to the loss of both tahr and leopard.

MUSANDAM AND NORTHERN EMIRATES

In Ras Al Khaimah, current research indicates that although there is leopard presence, the density is very low, with an estimate of 5-10 in the whole Musandum/N Emirate area. Scrapings, faeces, tracks and kills have all been found in wadi's with permanent water. Unfortunately the main wadi where this is found is a route for illegal immigrants, so heavily disturbed.

In May 1993 a leopard was killed in Ras al Khaimah, which is corroborated with photographic evidence.

In 1994 photos of locals skinning a male leopard were circulated in the Northern Emirates. Reports indicate that a companion leopard was shot and wounded, and ran off into the mountains.

A discussion incurred as to the thoroughness of the research, and it was concluded that the best areas for a researcher to walk in these very rugged wadi's is along the bottom or along the top. It was decided that the leopard would do the same, jumping from ledge to ledge down the cliff faces to the wadi floor.

Water was decided as the limiting factor in the northern emirates and the Musandam. There are 3 rangers working for the Directorate of Nature Protection, Ministry of the Environment and Municipalities, Oman near Khasab.

RECOMMENDATIONS FOR THE MANAGEMENT OF THE CAPTIVE POPULATION OF ARABIAN LEOPARD

1 ESTABLISHMENT OF A MEMORANDUM OF PARTICIPATION FOR CAPTIVE MANAGEMENT OF THE ARABIAN LEOPARD BETWEEN CURRENT HOLDERS (OMBC (OMAN), BC SHARJAH (UAE), BC TA'IF (SAUDI ARABIA) AND BC TA'IZ (YEMEN)).

Specific transfer recommendations by the Arabian Leopard PHVA.

Move male Stbk 20 (Rachid) to BC- Oman to breed with female STBK 7,17,18.
MOVE MALE STBK 23 (AL- JEZIRI) TO BC- OMAN TO BREED WITH FEMALE STBK 7, 17, 18
Both these male should breed within the next year, which means pairing with one or two of the above females 7, 17 and 18.

The breeding pair (13 and 6) at Sharjah BCEAW should continue to breed for the next season. At Ta'iz,Yemen the pair which had cubs and did not survive should be paired again and the female removed 2-3 weeks before cubbing to a quite enclosure.

The proposed regional studbook should be approved and continue to be updated. This needs to get official approval within a regional zoo association.(EAZA).

LIMITING FACTOR MANAGEMENT (HUNTING, TRADE AND DECLINING PREY SPECIES)

Hunting and Trade.

Establish in Ras Al Khaimah a pilot project for compensation payments to shepherds who loose hoofstock to the leopard. Research into the actual losses directly due to hunting. This can be undertaken with existing and proposed survey work.

Encourage range states to enforce existing laws and agreements concerning illegal capture/killing and trade of wildlife. Improve existing legislation by detailing each species with penalties imposed.

Encourage range states to ratify and enforce existing international wildlife conventions, especially CITES and Bonn Convention.

Wild Population Management..

Survey leopard status in Al Wadah proposed protected area within Yemen. Begin with ground survey for leopard signs and possible to deploy camera traps. Assess habitat and status of other wildlife within Al Wadah. Assist the responsible authorities with the drafting of a management

plan for Al Wadah. Survey other possible 'leopard areas' for existence of leopards within Yemen.

Support efforts by the Kingdom of Saudia Arabia to establish protected areas which allow the possible migration of leopards from the northern distribution to the Yemeni border.

HABITAT MANAGEMENT.

Formulate and stimulate endorsement of clear hunting laws for each species of carnivore, including penalties and set fines. Also to critically monitor the enforcement of hunting laws when they are in place. This may also include live capture through trapping and trade.

Recommend and encourage the creation of protected areas centered on the presence of the Arabian leopard as a flagship species. Revenue generated from eco-tourism within these protected areas will be ploughed back into local communities. Eco-tourism is not possible for the Leopard due to behavioral avoidance of the species to man, however the mere presence of such a charismatic species has shown in other countries to stimulate eco-tourism. Prey species such as Tahr, Ibex, Mountain Gazelle, Hyrax, Game Birds would be visible.

Habitat management within protected areas; keeping livestock under closer supervision. Ideally habitat management should focus on providing habitat for leopard prey species.

Livestock management is essential to reduce the risk of predation by leopards. In Yemen livestock is already tended in corrals, and this concept is recommended to be expanded to all stock farmed inside leopard areas.

Advise against any introduction of exotic species in habitats or unfenced protected areas.

'Blanket compensation' Contract with local communities that will include a reward for preservation of local wildlife i.e. Prey species (Tahr, Ibex, Mountain Gazelle, Hyrax, Game Birds etc.). Hunting within a tribal area will forfeit the yearly reward to that particular tribe.

Compensation scheme for livestock losses, not including livestock unattended at night (Reference to Discussion: pp 187 – 188, IUCN Cat Action Plan , Nowell and Jackson 1996. A proposal for such a kind of scheme has already been planned by the Arabian leopard trust, UAE (R. Lewellyn-Smith, pers. Comm.). Compensation scheme should initially center on the buffer zones of protected areas to have a positive effect on dispersing leopards leaving these areas.

LEOPARD VORTEX Population Modeling

The values for the global parameters were 200 iterations for 100 years with a 10 year reporting interval for each scenario. The criterion for extinction was defined as all animals of one sex or no animals remaining. One population was modeled with no concordance between the EV for reporduction and survival. Inbreeding was included in some scenarios for comparison with no inbreeding. One catastrophe was examined in a few scenarios. The species is polygynous. Female age of first breeding age was examined for 2 and 3 years. The male age used was 4 years. The maximum breeding age was set at 10 years. Maximum litter size is 2 and the sex ratio at birth is 1:1. Density dependence was not included because of the feeling that the populations are much lower than carrying capacity.

The values for population specific parameters not changed in any of the scenarios are 50% with (EV = 12.5%) of females breed each year and a litter size distribution of 40% with one and 60% with two. Only 50% of the males are considered to be in the breeding pool each year. We always atarted with a stable age distribution. No trend in carrying capacity was included and no EV in K (carrying capacity) was used. No harvests or supplements were included. All juvenile mortality values were set at 10% with a SD of 3%. These values may be conservative and there may be differential male and female mortality but no data are available on the sex or age structure of the wild population. It would be usefu to look at demographic data from other leopard populations, if this available.

Population specific parameters which were varied included the mortality rate for the 0-1 year age class with values of 30%, 40%, 50%, and 60% evaluated. Adult age class mortality values used were 5%, 7%, 9%, and 11%. Starting population sizes of 25, 50, 100, 200, and 300 were examined. Carrying capacity was set at 500 for populations of 300 and at 200 for the remaining population sizes. Note that of the global parameters inbreeding and age of first reproduction for females were also varied.

Complete sets of scenarios were run with all variable parameter values systematically included in a symetrical sensitivity analysis. Selected scenario results for population numbers, population persistence, and inbreeding are presented in graphs plotted at 10 year intervals for the 100 years of the projections (Figures 1 - 16). The summary population output data (deterministic r, stochastic r, SD of stochastic r, probability of extinction - Pe, mean surviving population size - N, SD of N, Alleles, SD of alleles, Heterozygosity, SD of Het, and mean time to extinction - Te) are presented in tables (Tables 1-5). The file designation column refers to individual output files.

Verson 8.2 of VORTEX, dated 6 June 1999 was used for the simulations. This program is available from the CBSG office in Minnesota (email office@cbsg.org).

ARABIAN LEOPARD VORTEX INPUT FILE:

PHVA 11 February 2000, Sharjah

```
ARAB001.OUT     ***Output Filename***
Y     ***Graphing Files?***
N     ***Details each Iteration?***
200     ***Simulations***
100     ***Years***
10     ***Reporting Interval***
0     ***Definition of Extinction***
1     ***Populations***
N     ***Inbreeding Depression?***
N     ***EV concordance between repro and surv?***
1     ***Types Of Catastrophes***
P     ***Monogamous, Polygynous, or Hermaphroditic***
3     ***Female Breeding Age***
4     ***Male Breeding Age***
10     ***Maximum Breeding Age***
50.000000     ***Sex Ratio (percent males)***
2     ***Maximum Litter Size (0 = normal distribution) *****
N     ***Density Dependent Breeding?***
Pop1
50.00  **breeding
12.50  **EV-breeding
40.000000     ***Pop1: Percent Litter Size 1***
30.000000  *FMort age 0
7.000000  ***EV
10.000000  *FMort age 1
3.000000  ***EV
10.000000  *FMort age 2
3.000000  ***EV
5.000000  *Adult FMort
3.000000  ***EV
30.000000  *MMort age 0
7.000000  ***EV
10.000000  *MMort age 1
3.000000  ***EV
10.000000  *MMort age 2
3.000000  ***EV
15.000000  *MMort age 3
3.000000  ***EV
5.000000  *Adult MMort
3.000000  ***EV
0.000000     ***Probability Of Catastrophe 1***
N     ***All Males Breeders?***
Y     ***Answer--A--Known?***
50.000000     ***Percent Males In Breeding Pool***
Y     ***Start At Stable Age Distribution?***
25     ***Ini  tial Population Size***
200     ***K***
0.000000     ***EV--K***
N     ***Trend In K?***
N     ***Harvest?***
N     ***Supplement?***
Y     ***AnotherSimulation?***
```

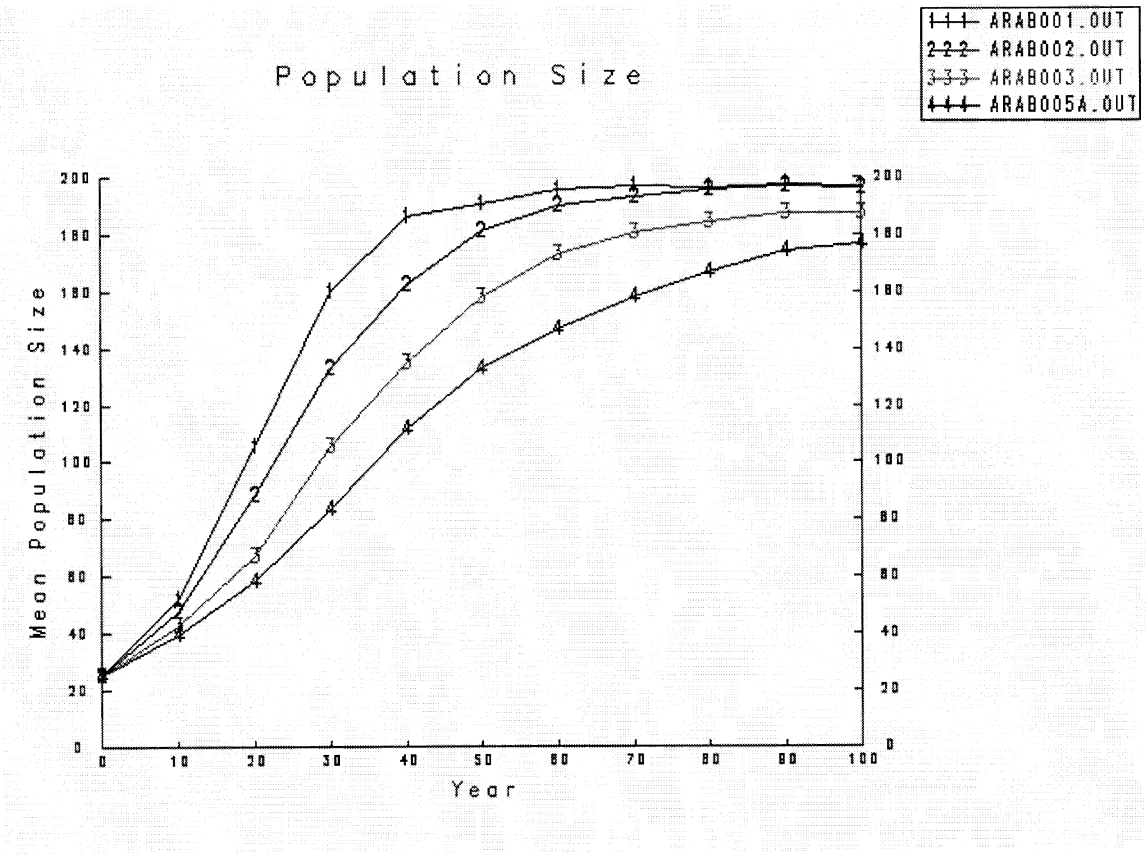


Figure 1. Effects of 5% (#1), 7% (#2), 9% (#3), & 11% (#4) annual adult mortality with 0-1 year annual mortality of 30% on mean population size at 10 year intervals over 100 years. Age female first reproduction = 3 years and starting N = 25.

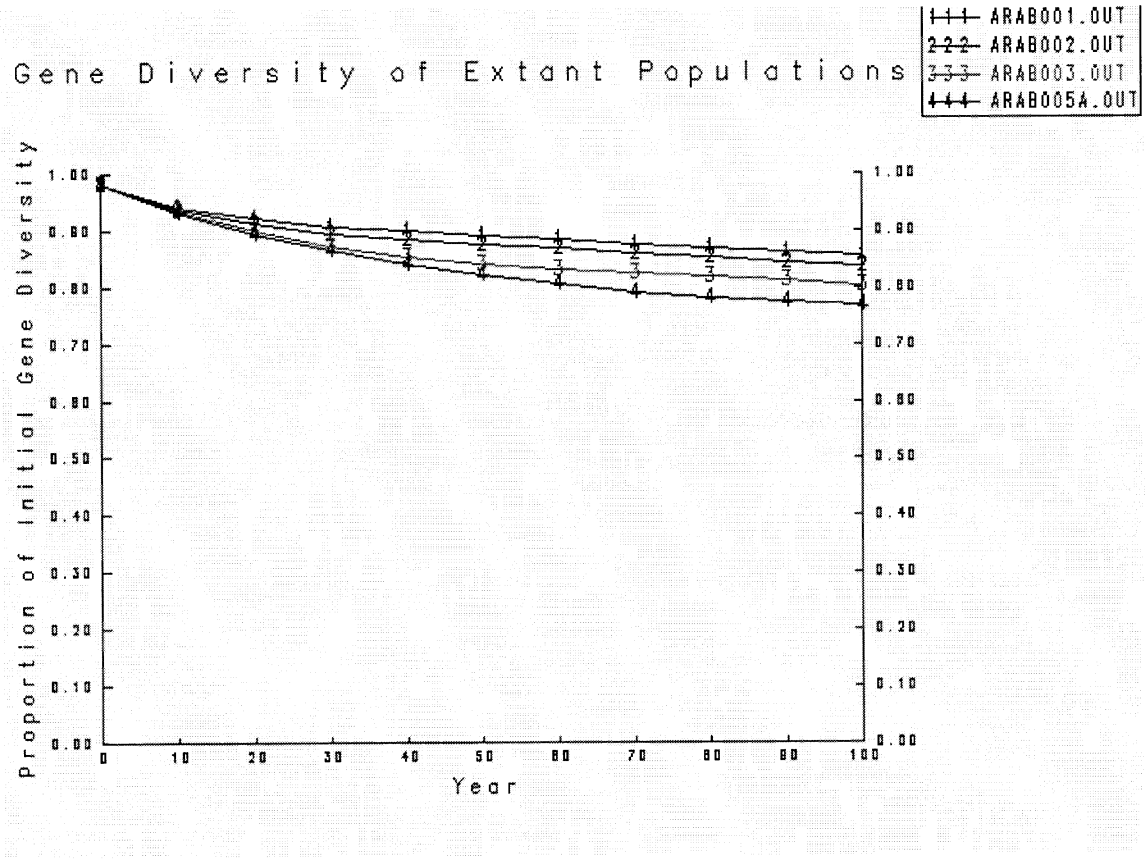


Figure 2. Effects of 5 (#1), 7 (#2), 9 (#3), & 11 (#4) % annual adult mortality with 0-1 annual mortality of 30% on mean loss of heterozygosity at 10 year intervals over 100 years. Age female first reproduction = 3 years and starting N = 25.

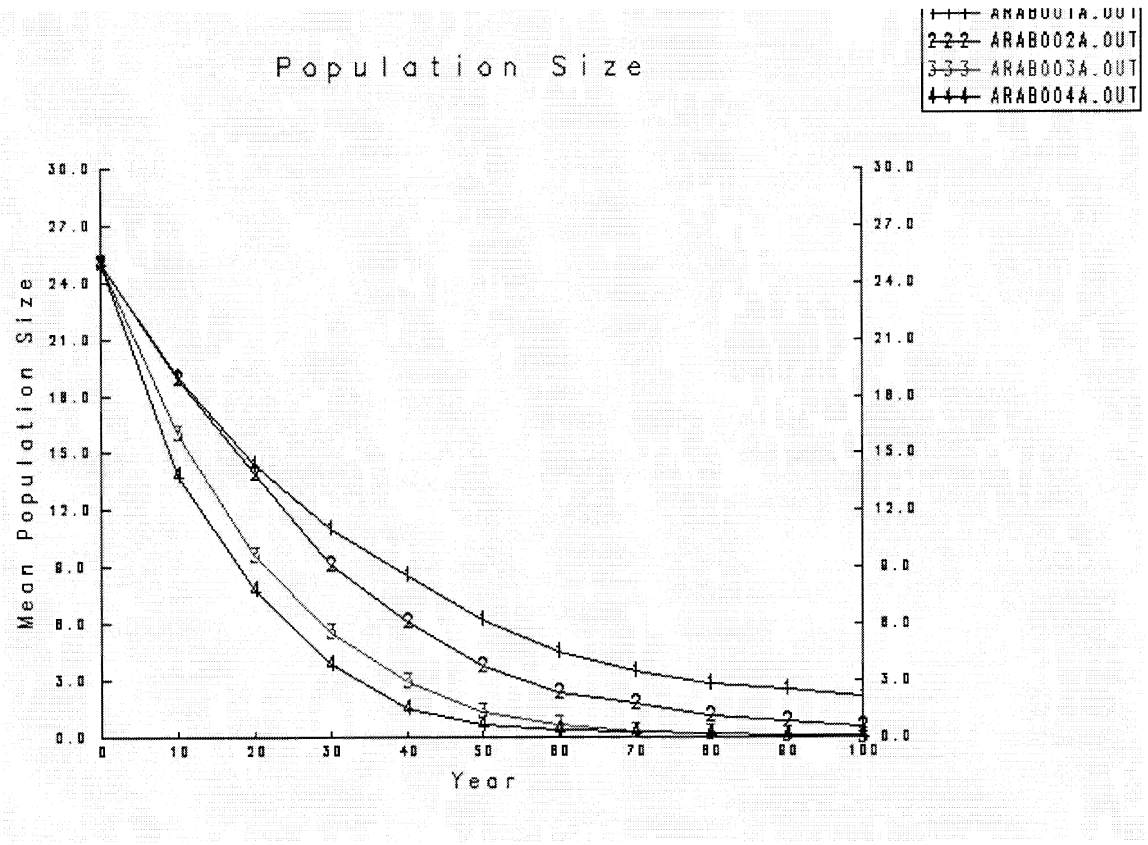


Figure 3. Effects of 5 (#1), 7 (#2), 9 (#3), & 11 (#4) % annual adult mortality with 0-1 annual mortality of 60% on mean population size at 10 year intervals over 100 years. Age female first reproduction = 3 years and starting N = 25.

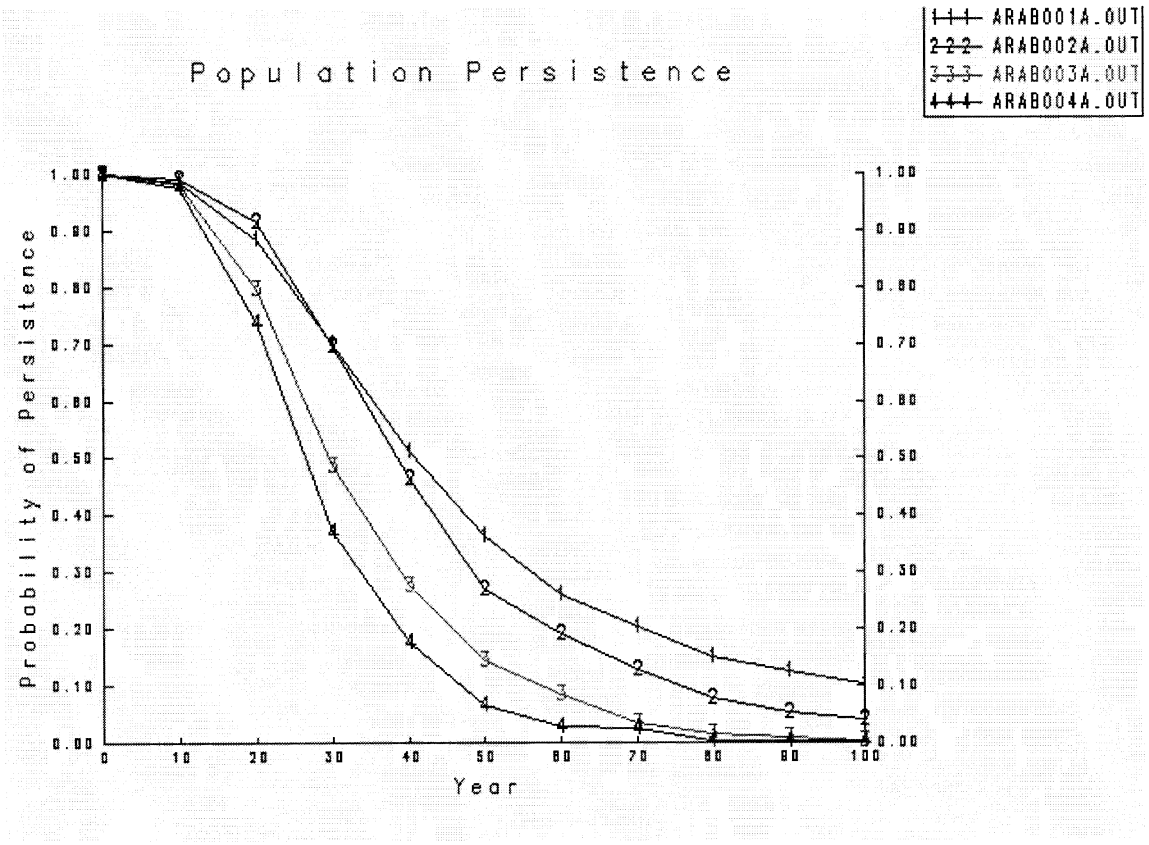


Figure 4. Effects of 5% (#1), 7% (#2), 9% (#3), & 11% (#4) annual adult mortality with 0-1 annual mortality of 60% on population persistence (extinction rate) at 10 year intervals over 100 years. Age female first reproduction = 3 years and starting N = 25.

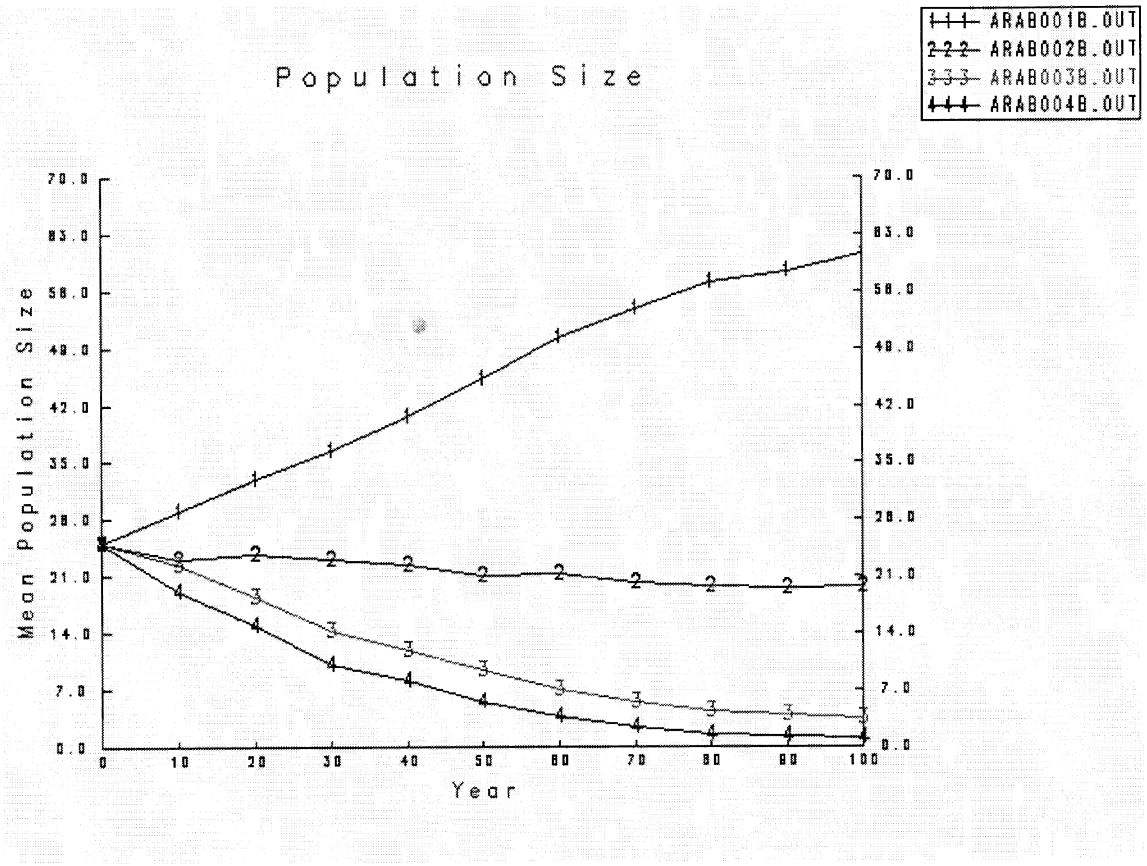


Figure 5. Effct of 2 year old age of first reproduction on effects of 5% (#1), 7% (#2), 9% (#3), & 11% (#4) annual adult mortality with 0-1 annual mortality of 60% on mean population size at 10 year intervals over 100 years. Age female first reproduction = 2 years and starting N = 25. There are more and larger surviving populations with the 2 year old AFR.

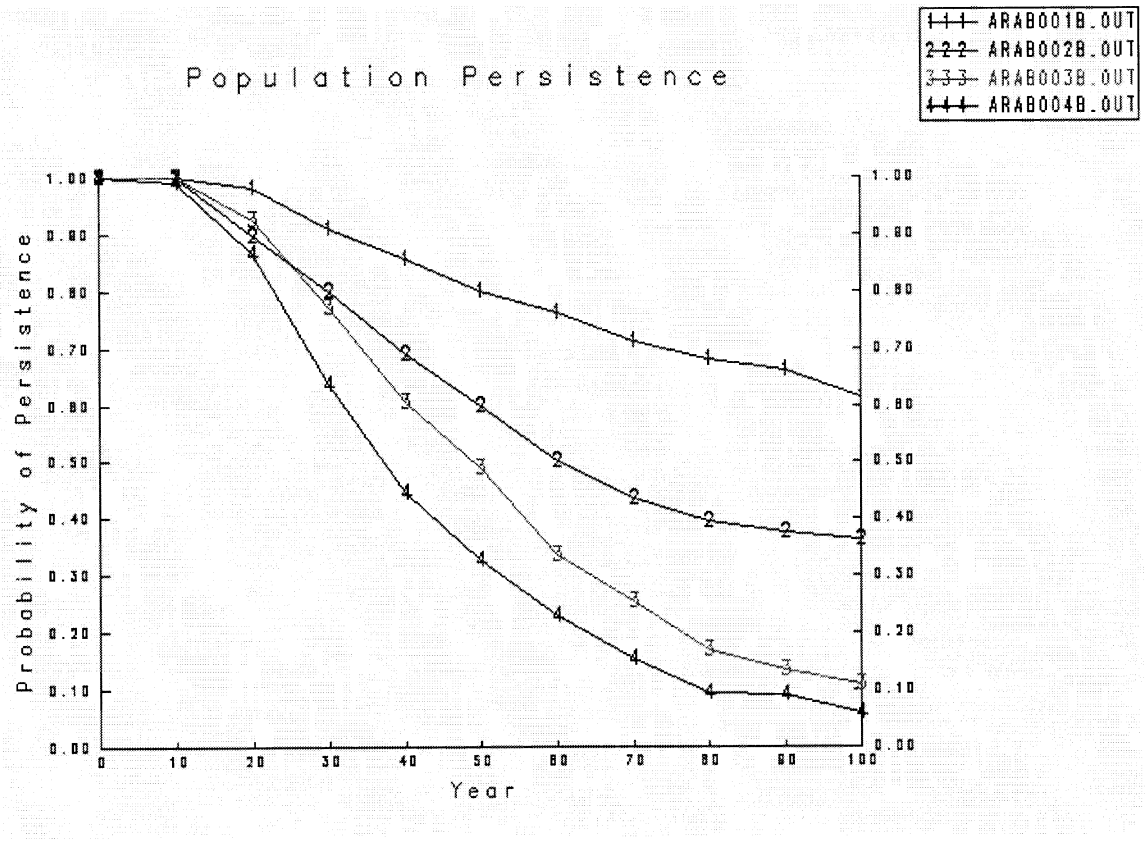


Figure 6. Effects of a 2 year old age of first reproduction on effects of 5% (#1), 7% (#2), 9% (#3), & 11% (#4) annual adult mortality with 0-1 annual mortality of 60% on population persistence (extinction rate) at 10 year intervals over 100 years. Age female first reproduction = 2 years and starting N = 25. Extinction rates range from 6% 62% and the highest adult mortality rate. The populations persist longer (the extinction rate is slower) and a few may survive to reach carrying capacity at the lowest adult mortality rate. But note that this is without inclusion of inbreeding depression or catastrophes.

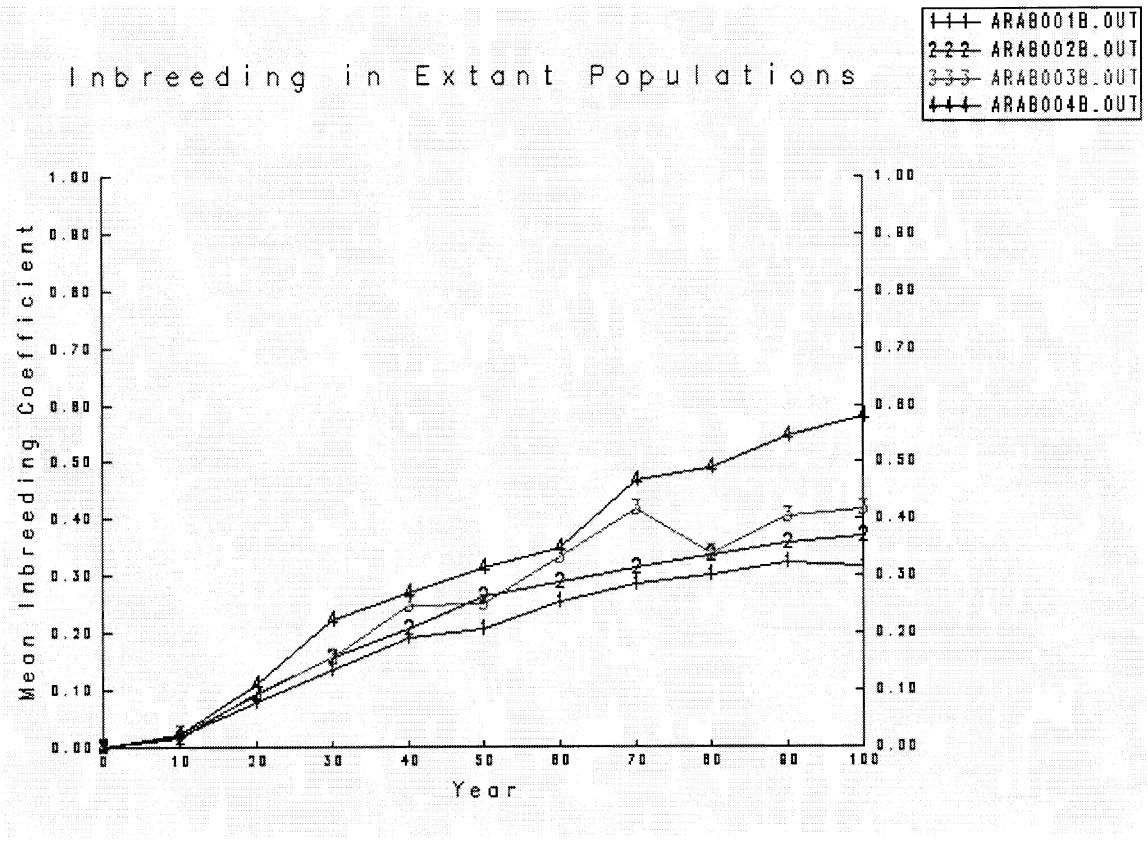


Figure 7. Effect of an earlier age of first reproduction on the effects of 5% (#1), 7% (#2), 9% (#3), & 11% (#4) annual adult mortality with 0-1 annual mortality of 60% on mean inbreeding coefficient at 10 year intervals over 100 years. Age female first reproduction = 2 years and starting N = 25. The level of inbreeding ranges from 0.32 to 0.58. Addition of inbreeding depression to these scenarios will increase the extinction rate and shorten the time to extinction.

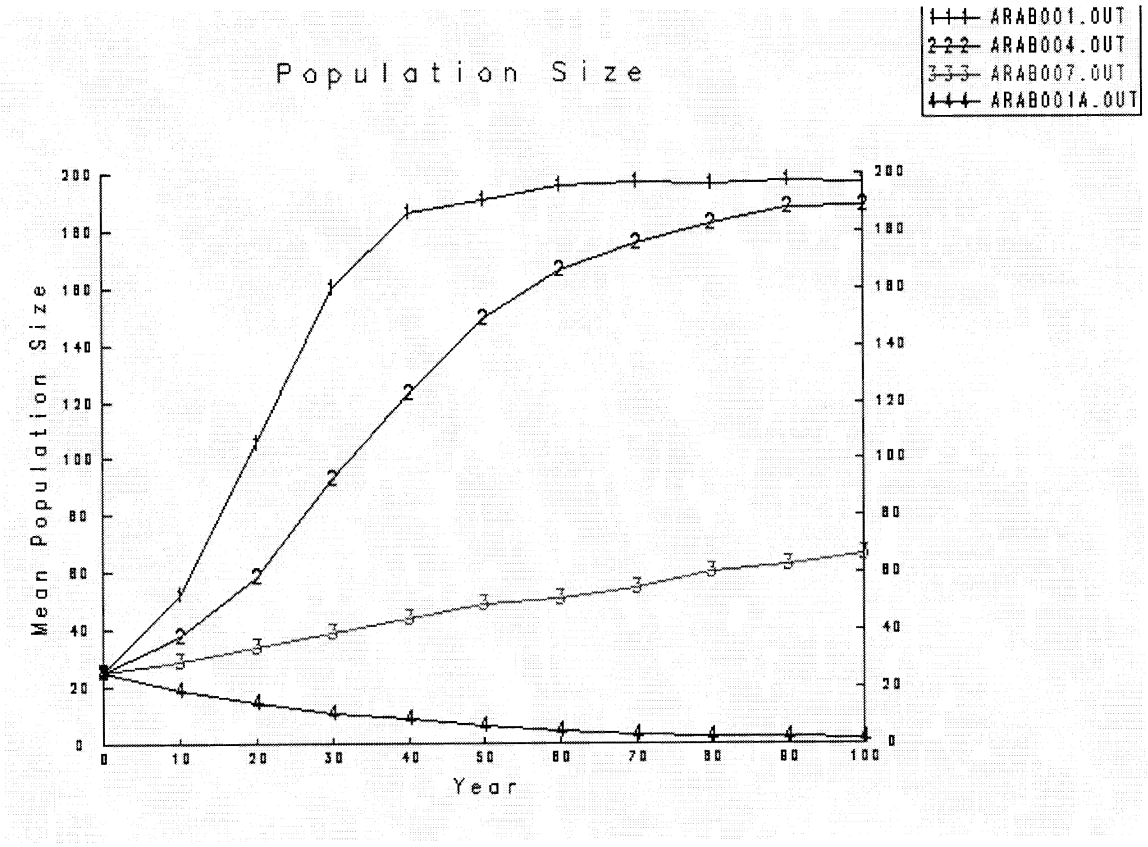


Figure 8. Effects of 30 (#1), 40, 50, & 60% annual 0-1 year mortality at 5% annual adult female mortality on mean population growth at 10 year intervals over 100 years. AFR = 3 and N = 25.

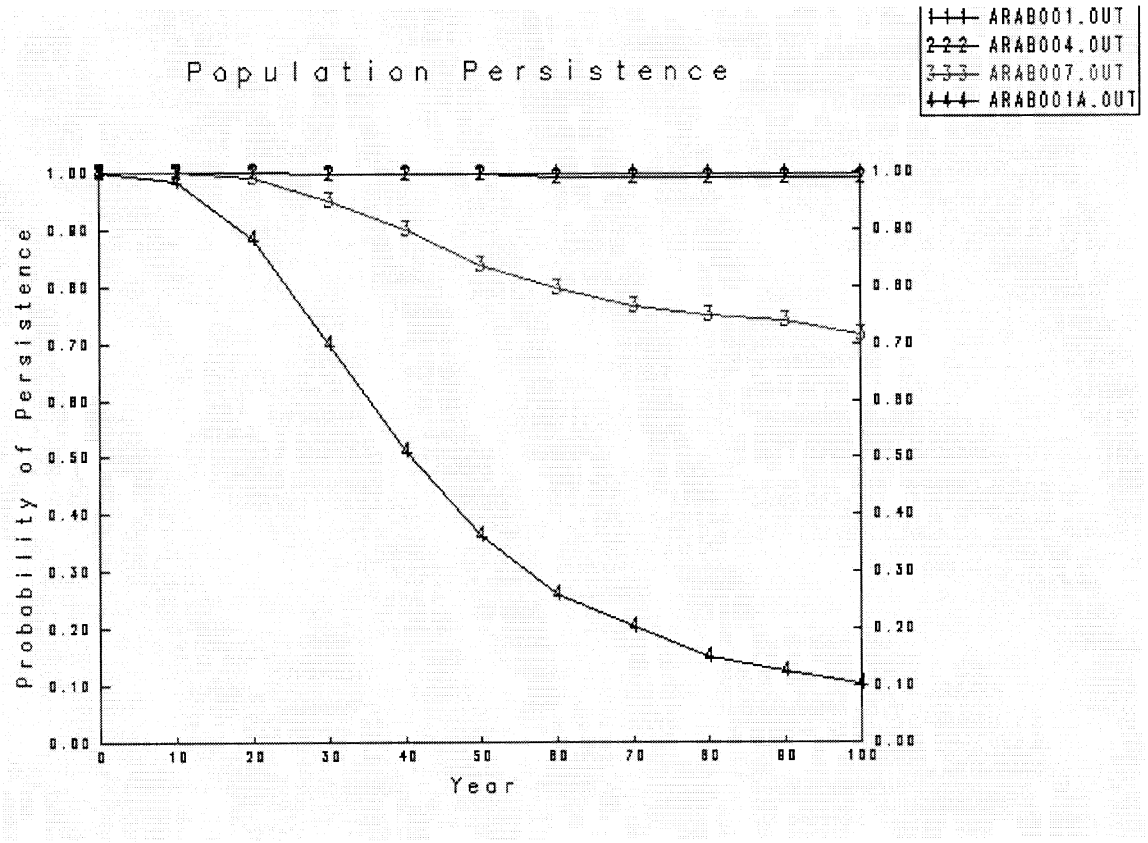


Figure 9. Effects of 30, 40, 50, & 60% annual 0-1 year mortality at 5% annual adult female mortality on population persistence (extinction rate) at 10 year intervals over 100 years. AFR = 3 and N = 25.

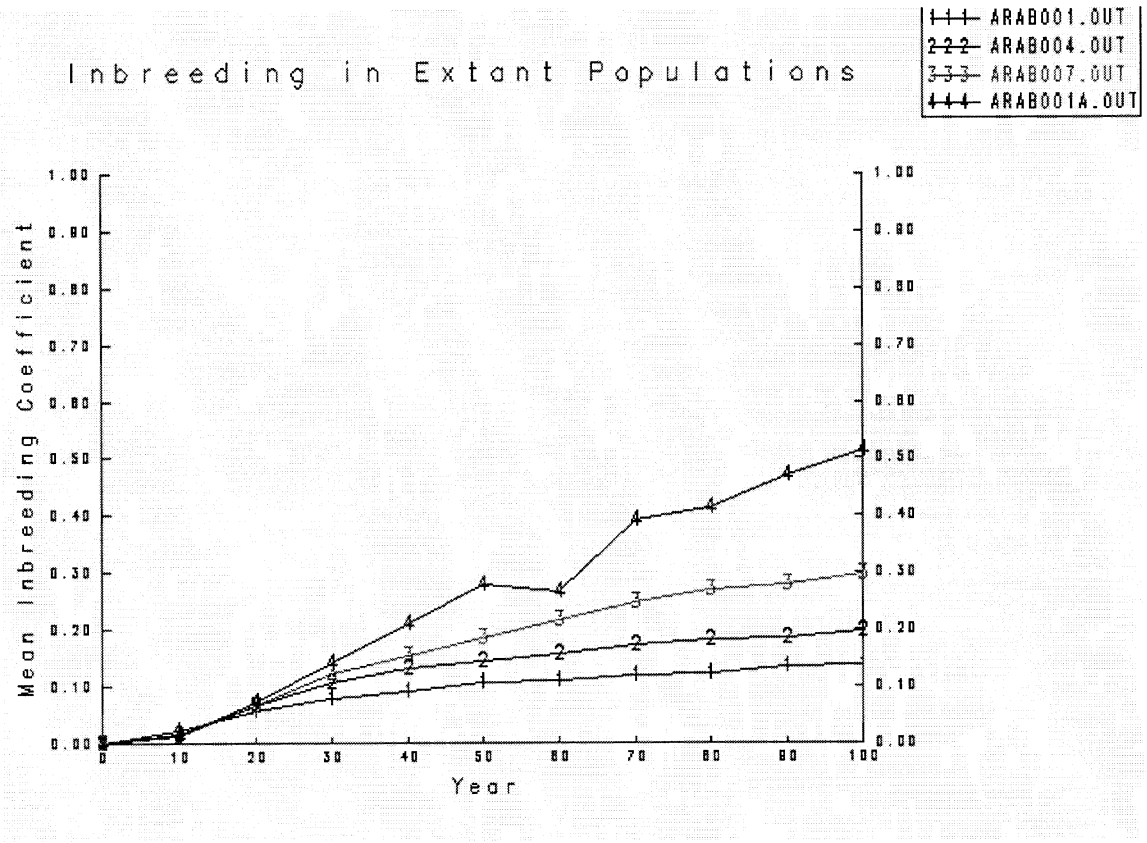


Figure 10. Effects of 30, 40, 50, & 60% annual 0-1 year mortality at 5% annual adult female mortality on inbreeding in surviving populations at 10 year intervals over 100 years. AFR = 3 and N = 25.

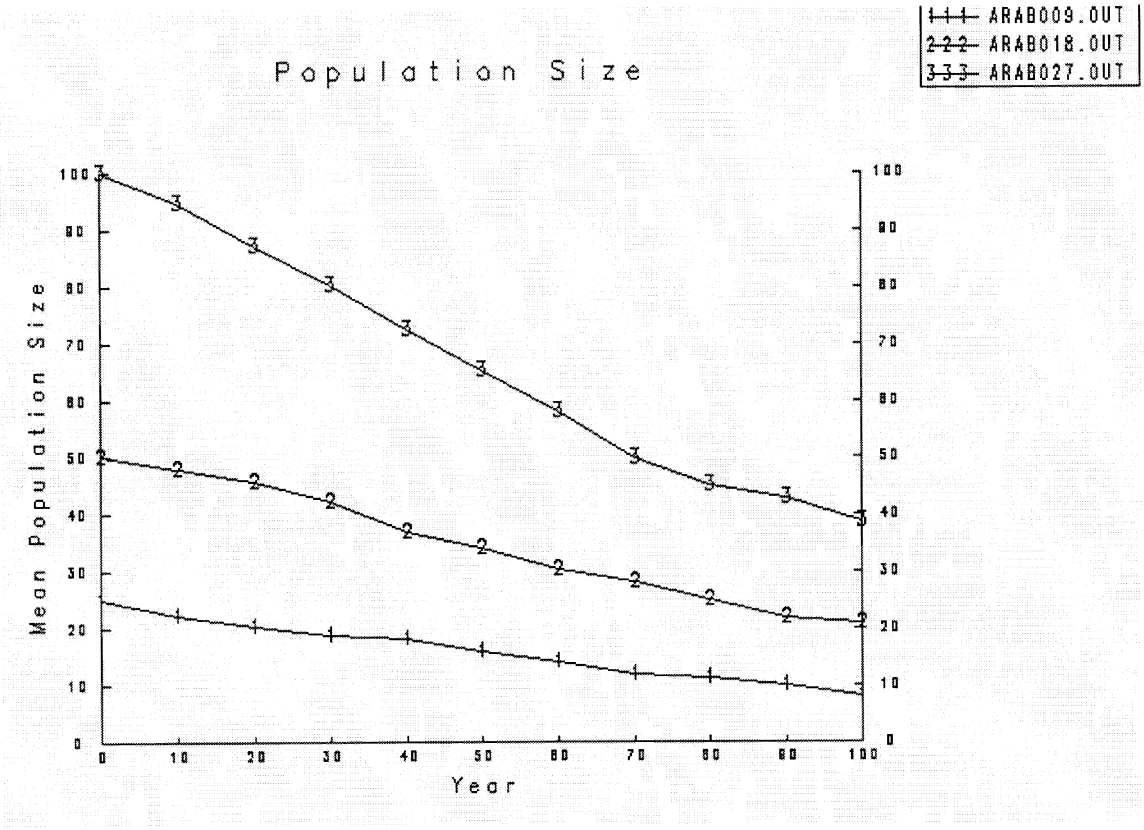


Figure 11. Effects of starting population size of 25, 50, or 100 on population growth with 9% annual adult mortality and 50% annual 0-1 year mortality. AFR = 3.

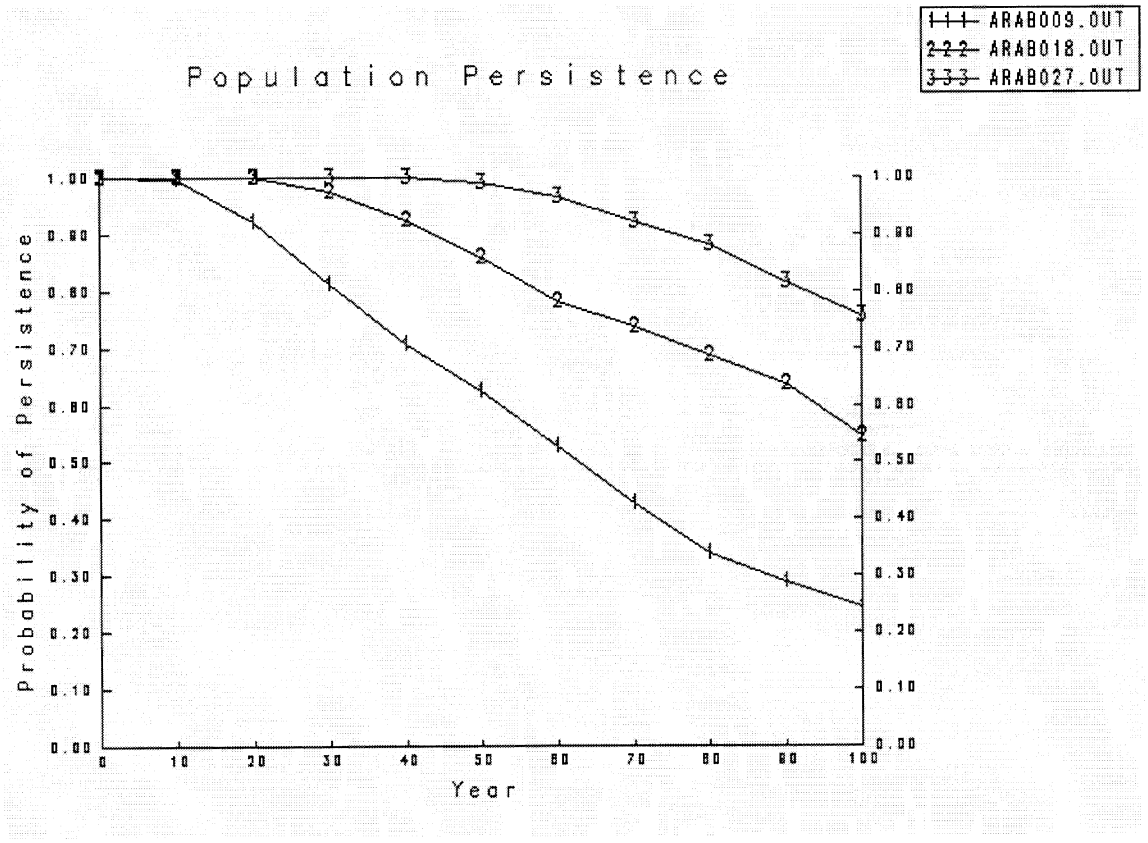


Figure 12. Effects of starting population size of 25, 50, or 100 on population persistence (extinction rate) with 9% annual adult mortality and 50% annual 0-1 year mortality. AFR = 3.

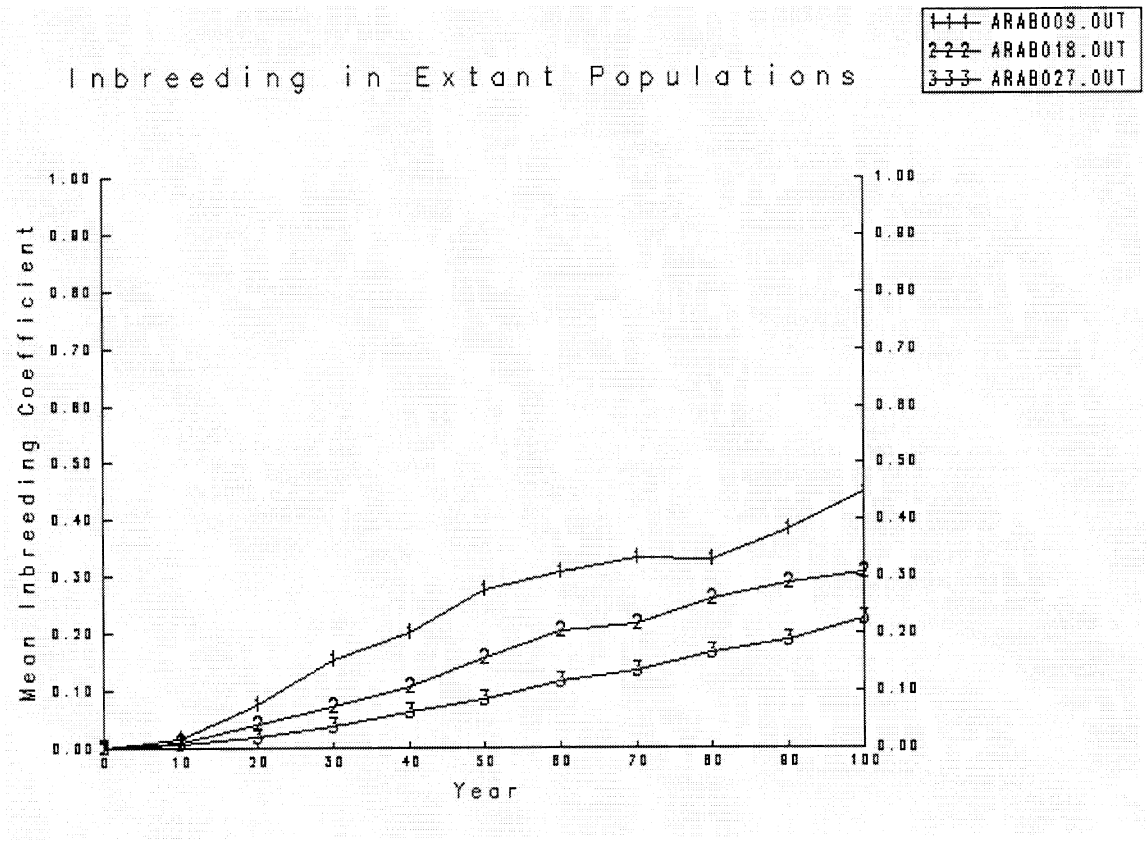


Figure 13. Effects of starting population size of 25, 50, or 100 on rate of inbreeding at 10 year intervals over 100 years with 9% annual adult mortality and 50% annual 0-1 year mortality. AFR = 3.

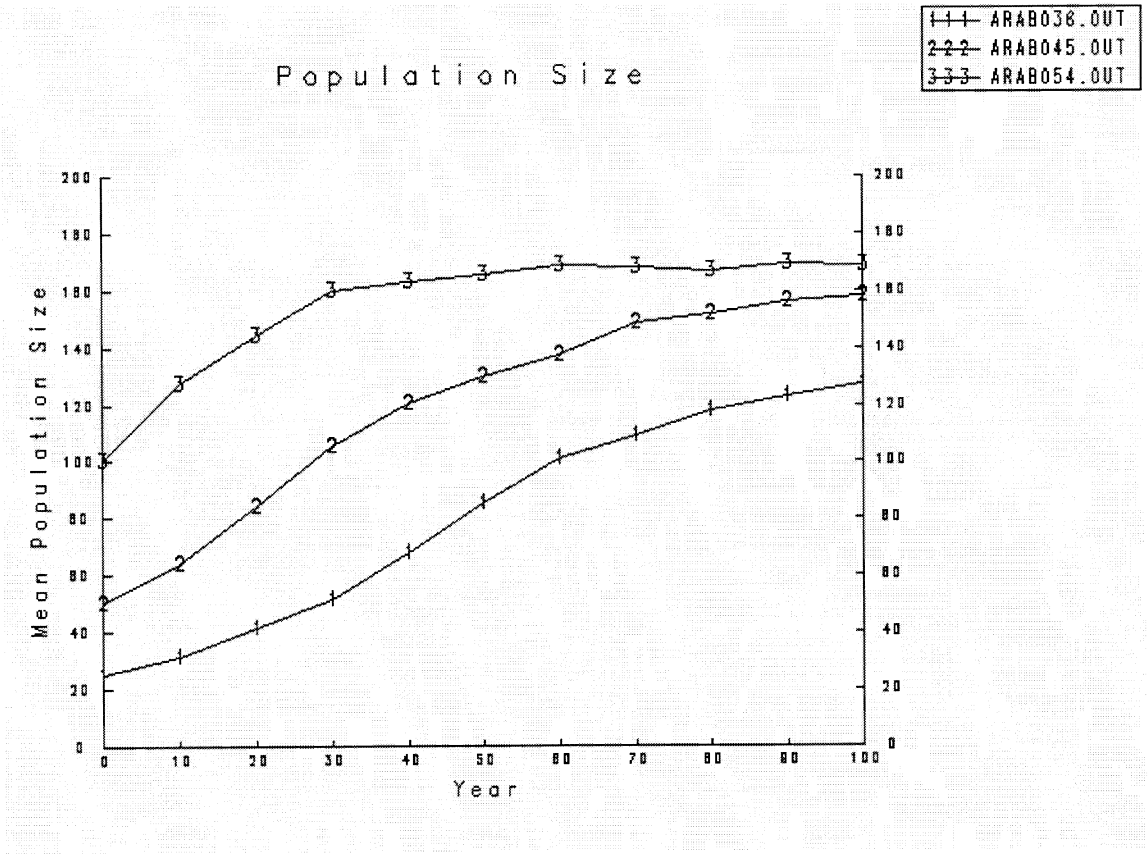


Figure 14. Effect of AFR = 2 on effects of starting population size of 25, 50, or 100 on population growth with 9% annual adult mortality and 50% annual 0-1 year mortality. AFR = 3, K = 200.

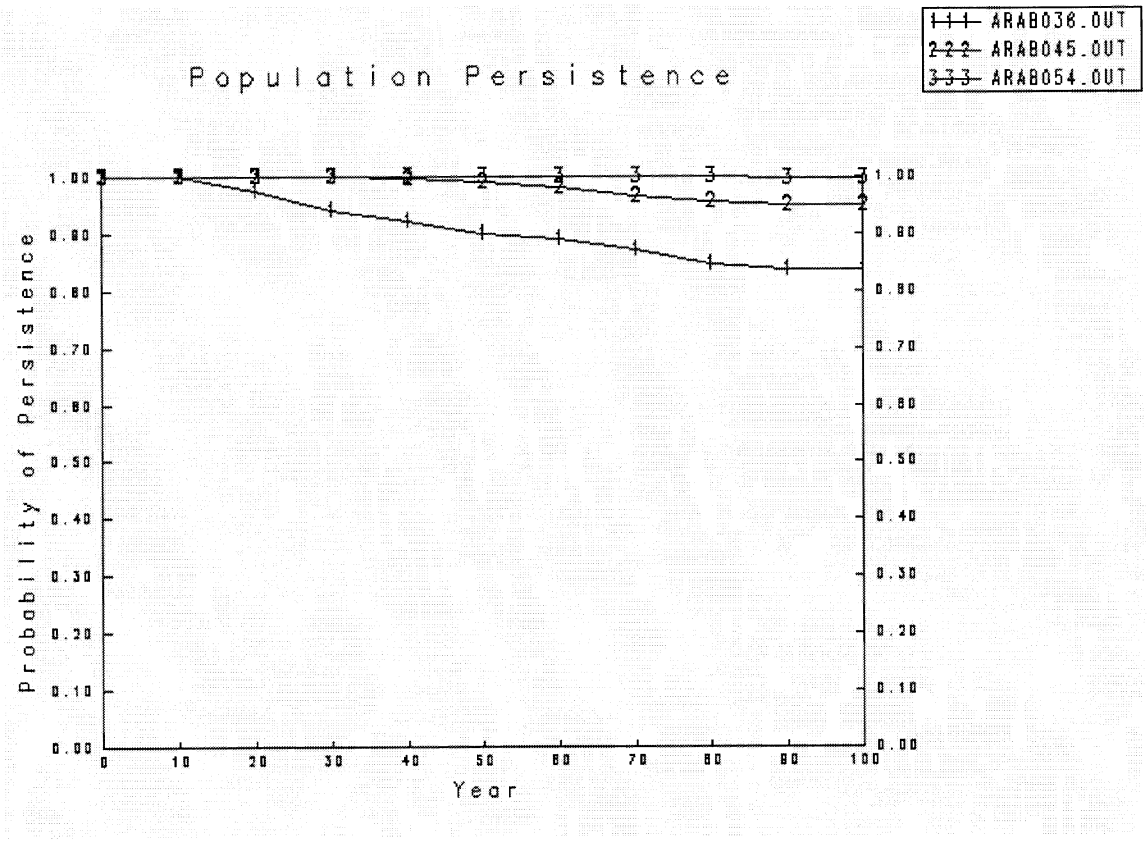


Figure 15 Effect of AFR = 2 on effects of starting population size of 25, 50, or 100 on population persistence with 9% annual adult mortality and 50% annual 0-1 year mortality. AFR = 3, K = 200.

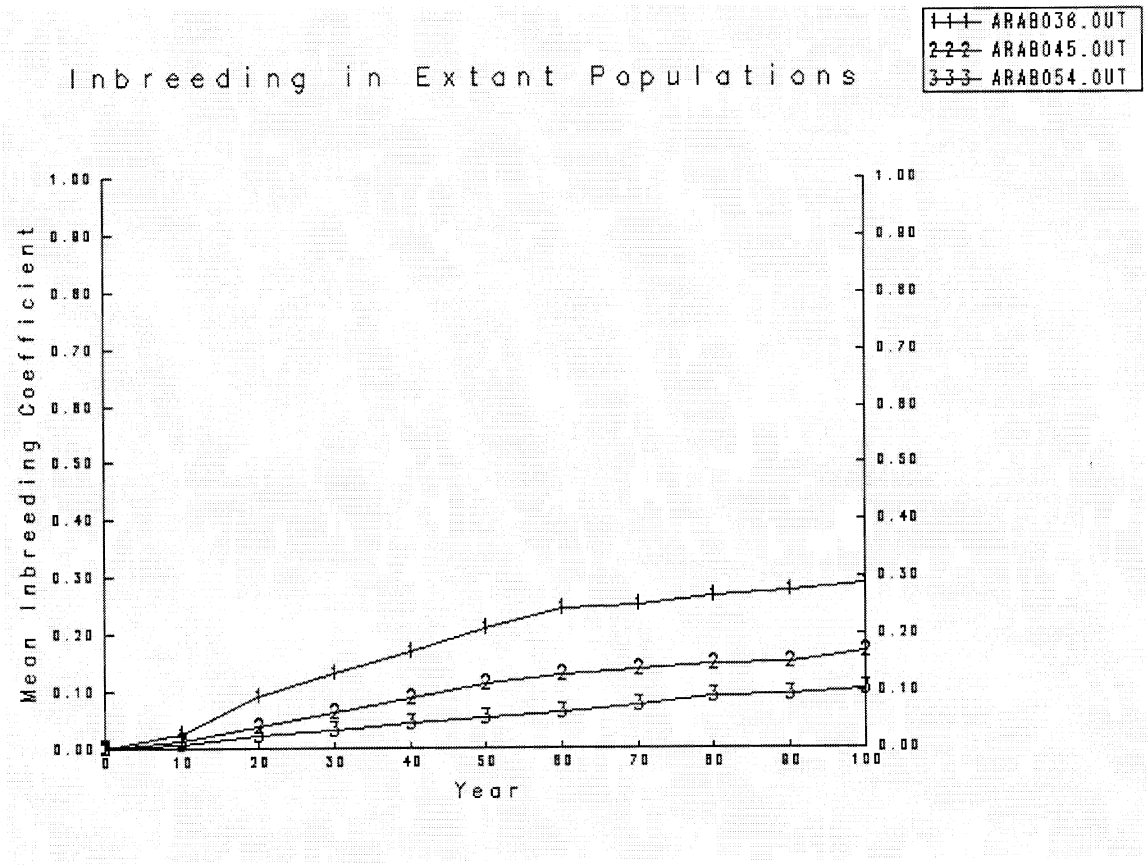


Figure 16. Effect of AFR = 2 on effects of starting population size of 25, 50, or 100 on rate of inbreeding in surviving populations with 9% annual adult mortality and 50% annual 0-1 year mortality. AFR = 3, K = 200.

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP)
FOR
ARABIAN CARNIVORES
&
POPULATION AND HABITAT VIABILITY ASSESSMENT (PHVA)
FOR THE
ARABIAN LEOPARD AND TAHR

SECTION 5

TAHR PHVA REPORT

POPULATION AND HABITAT VIABILITY ASSESSMENT
for the Arabian Tahr *Hemitragus jayakari* Thomas 1894

Summary.

Populations of the Arabian tahr have shown themselves to be resilient in a difficult environment. Evidence comes both from recent observations in the field and from simulations using *Vortex* , software, the input being based on the best available knowledge of factors affecting populations of tahr. Best estimates of tahr population from field observations suggest that the total population has risen from 2,000 or so animals in 1978 to about 6,400 in 1998. The increase is due to two factors, first a relief from hunting in key areas and, secondly a reduction in grazing pressure. With increasing affluence pasturalists are reducing their dependence upon goats and the extent of their movements in the middle and upper areas of the mountains have also been reduced making more, and better quality, grazing available for tahr. This optimistic assessment does not apply to the Musendam Governate.

Vortex simulation shows that tahrs are resilient in the face of droughts occurring every four years, which significantly increase mortality and reduce breeding success. Nevertheless the occurrence of additional negative factors such as disease and hunting adversely affect the population and simulations show an increase in unpredictability in the population profile of groups, especially smaller groups. Tahrs seem particularly vulnerable to adverse conditions in which the mortality of young in the first year exceeds 40-45% per annum.

There is anecdotal evidence that small populations of Tahr may be wiped out when discovered by hunters, often at waterholes where water dependent tahr must drink. The impact of these events on the overall tahr population is difficult to assess. It is important that an understanding is reached of the extent to which tahr migrate and elucidate the factors that lead to migration. If migration is widespread then there are implications for disease spread and for inbreeding and genetic diversity, but more important it will determine whether tahr should be managed as a single population or a number of isolated sub-populations.

The main recommendations of the PHVA aim to:

4. Reduce factors which increase tahr mortality, especially mortality in the first year; specifically:
    a. To reduce disease transmission to tahr from domestic stock by ensuring an effective programme of vaccination against the most common diseases in domestic stock living in and around areas occupied by tahr; (Priority 1).
    b. To support the ranger forces in Oman and to encourage the establishment of similar forces within the UAE to protect the Arabian tahr for illegal capture, hunting and trade (Priority 2).

5. To enhance our understanding of the species biology and socio-ecology;
    a. By undertaking a study of all factors relating to migration of tahr from one area of mountains to another; (Priority 3)

b. By undertaking basic research on the biology and ecology of the tahr (Priority3.).

6. To establish an informal group to address administrative and practical matters relating to the exchange of captive animals so that animals are not illegally and incompetently taken from the wild (Priority 5).

Introduction.

The first studies of the Arabian tahr were undertaken during the period from 1976 to 1978 see Munton 1985. This work described the species as living in areas of diverse vegetation on the damper, cooler north facing steep slopes of the Hajar mountains in northern Oman and the UAE. Tahr were found in small social groups of a male, female and young, a social structure more typical of Arabian gazelle (Gazella gazella cora) than of caprinae. A population of 2,000 animals was estimated for 1978 with a small number of relatively large sub-populations, notably the Wadi Sarin (which later became a wildlife reserve) Wadi 'asy (Jabal Nakhal) and an area of Jabal Akdar known as al Hamya.. The main limiting factors were defined as:

1. competition with goats for grazing;
2. hunting pressure;
3. water dependence – the tahrs need for water makes it vulnerable for two reasons:
    a. in its search for water the tahr is drawn into areas where it finds itself in competition with goats for forage and water;
    b. it is vulnerable to hunting at waterholes or on regularly used routes to waterholes.

It was calculated that if hunting pressure could be dealt with and areas were set aside for tahr alone, then the population would rise at a rate of 6% per annum until carrying capacity was reached. Subsequently provision of good grazing with water that was easily available to tahr (but not to pastoralists and their animals) has been a key management objective for the Arabian tahr. A warden force was recruited in 1976/1978 to ensure agreements with local pastoralists not to use certain areas were observed and to monitor and act against hunting of the tahr.

Subsequent work has been done by Insall 1995 to 1998, who considers that tahr have done well in areas patrolled by the ranger force. He gives an estimate of the area of occurrence of tahr as 19,000 sq km of "primary" and "secondary" habitat. His work highlights the continuing importance of the populations in Wadi Sarin and in the Jabals around Nakhal but the population at Al Hamya seems to have disappeared and a substantial population of tahr has been identified at the southern limit of the tahrs range in Jabal Qahwan in the Ja'alan. There is some evidence that population are unstable, being present for a few years and then disappearing for reasons that are not known. Insall also identifies a further 17 areas where tahr are present and is able to show that tahr have an occupancy area of 13,400 sq km based on observations and by rangers and local corroboration. Additional information suggests the species is present in Jabal Hafit and Wadi Wurrayah (C and T Stuart 1995). Insall suggests that the tahr in northern Oman are benefiting from a change in pastoral practice resulting from the availability of other forms of income

allowing pastoralists to become less dependent upon goats for livelihood. This has resulted in pasotoralists settling at the mountain base near a road, so reducing grazing activity at middle and higher levels in the mountains and leaving more areas , of a better quality, available for the tahr to use undisturbed. The situation is different in the Musandam Governate where absentee households have released their goats into the mountains to range freely and reproduce freely and this caused a deterioration in the condition of the rangeland.

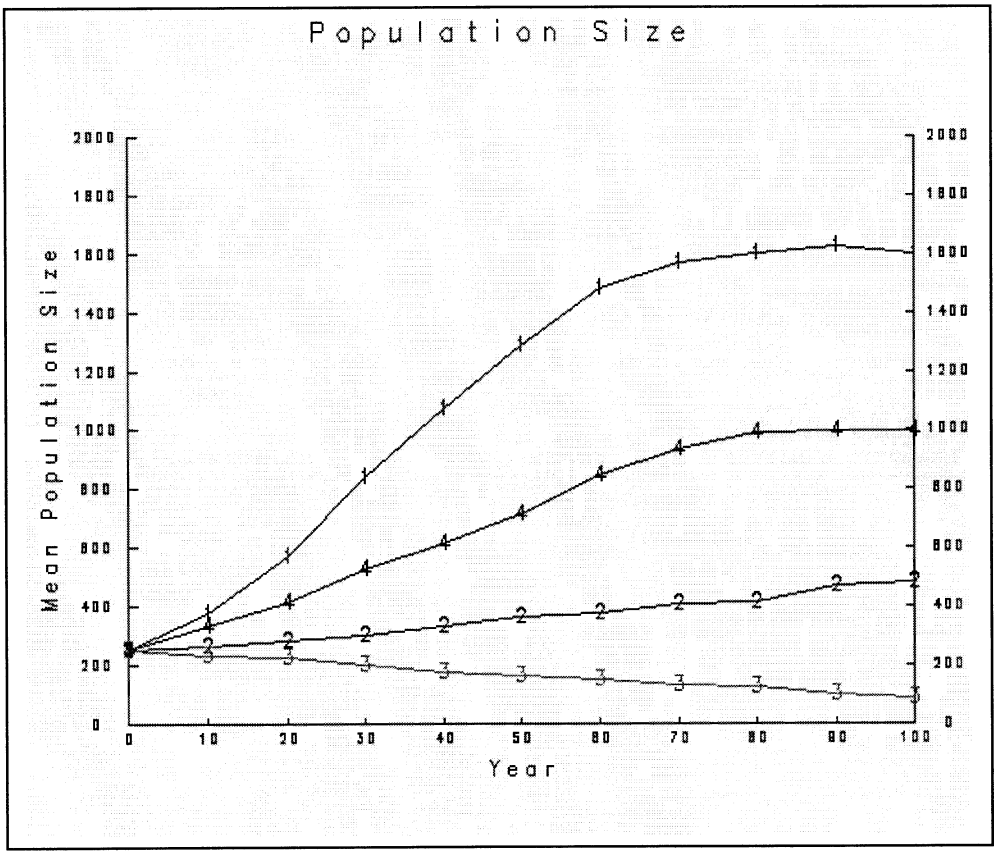
On the basis of the optimistic assessments coming from field observations in Oman new population estimates have been made. The first estimate is based on Insall's 1999 calculation of an area of occupancy of 13,400sq km. Insall argues that 24% of this (or 3216sq km) is primary habitat. Munton (1985) argued that a likely density in primary habitat would be about two animals per square kilometre. This would give a projected population in Oman in 1998 of approximately 6,400 animals. A second estimate was made by taking Munton's 2,000 estimate of population for 1978 and increasing it by 6% a year up to 1998 (when drought set in). This gives a total population size of around 6,400 animals also.

The Conservation Management Plan (CAMP) downgraded the tahr to Vulnerable from endangered on the grounds that the habitat remains severely fragmented (B1) and that there are extreme fluctuations in the number of populations and sub-populations (B3c).

Use of Vortex Simulations.

VORTEX software was used to highlight a number of factors that are important in the continuing survival or decline of populations of the Arabian tahr.

The curves generated by VORTEX indicate that there a number of factors which result in instability or decline in tahr populations in otherwise standard conditions. These standard conditions are those that are believed to reflect the conditions of tahr populations as defined by the knowledge held by the group of specialists. The standard conditions are a male and female mortality of 7% per year, a source population of 250 animals; female breeding age of 2 years to 10 years a male breeding age of 3 to 10 years, equal sex ratio, and an infant mortality of 35% mortality for females between 1 and 2 years is 25% (same for males.) In addition a drought every four years is regarded as the norm and the parameters were 25% frequency, the reduction of reproduction was 30% and mortality increases by 10% across all age classes. The study was undertaken by; systematically varying one or more of these conditions and comparing the results. In this manner factors associated with decline or instability were elucidated and these are set out below:



1) 7% mortality in females and one catastrophe with 35% mortality in 0-1 age class
2) 7% mortality in females and one catastrophe with 45% mortality in 0-1 age class
3) 7% mortality in females and two catastrophes with 45% mortality in 0-1 age class
4) 7% mortality in females and two catastrophes with 35% mortality in 0-1 age class

Fig 1. Demonstrates the affect kid mortality has on the overall viability of the population (N = 250). Run 1 demonstrates the projected population when there is 7% mortality in females and one catastrophe (drought) and 35% mortality in the 0-1 year age class (r = 0.037 Pe = 0 and N = 1597). Run 2 has increased kid mortality (45%) in the 0-1 age class (r = 0.001, Pe = 0.03 and N = 498). This demonstrates the sensitivity of the population to kid mortality. When a second catastrophe is included in the model, the population is capable of surviving these when kid mortality is kept around 35% (r = 0.016, Pe = 0 and N = 998). However, when kid mortality is increased to 45%, the population can not sustain itself. (r = -0.020, Pe = 0.15 and N = 103).

1. Under normal conditions, that is with a drought every four years, even groups with low initial populations levels have a good chance of survival Fig 1. Under more extreme conditions where there are additional pressures on populations such as hunting and high infant mortality the fluctuations in population are extreme so the chances of small populations becoming extinct through chance or stochastic factors are high. When conditions are difficult then a minimum founder population of 250 to 350 animals is required to avoid extinction over a hundred year simulation period. This is shown in Figure 2.

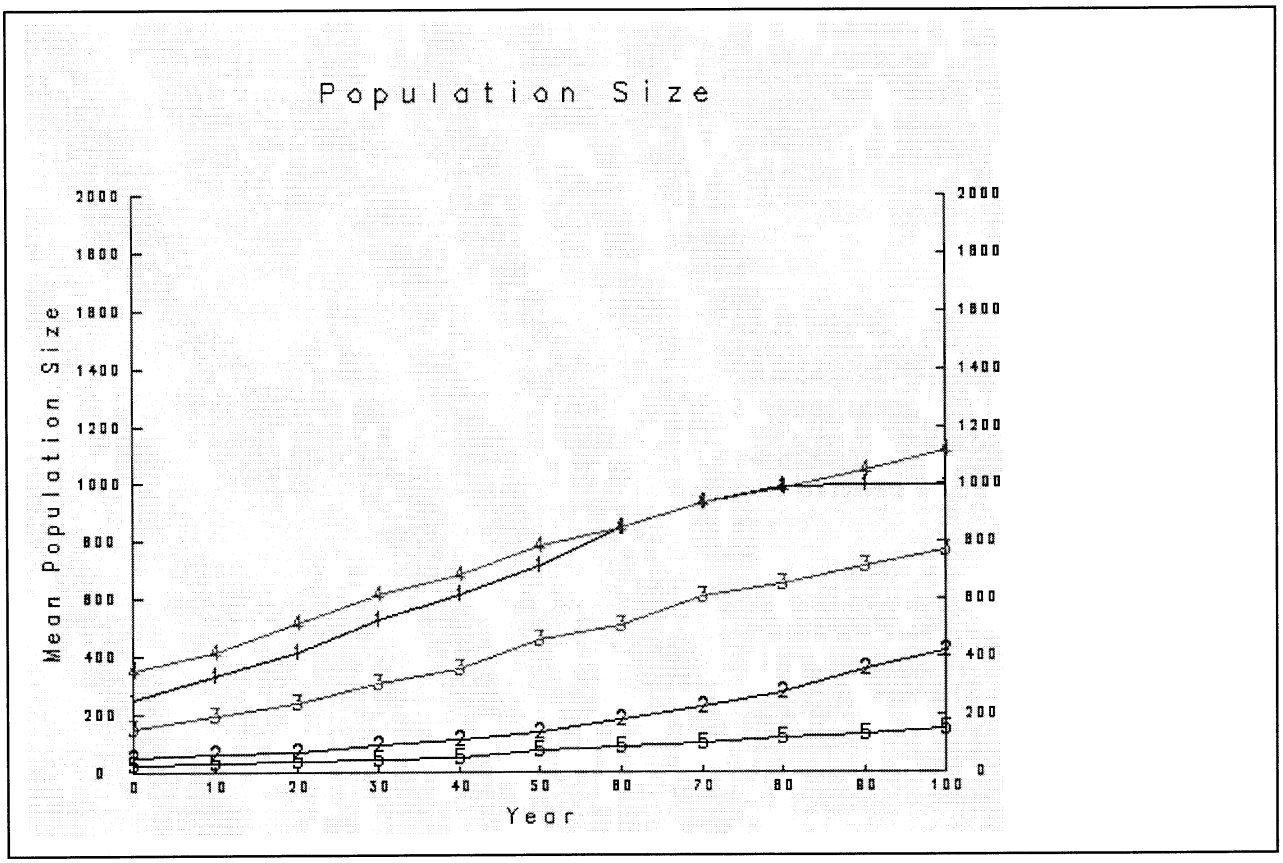


Fig 2. Demonstrates the minimum number of animals required (when these animals are subjected to the same environmental stresses and population dynamics) to maintain a viable population . The population dynamics were an adult mortality of 7%; kid mortality at 35% in the 0 – 1 age class. There were two catastrophes included, drought which had a 25% chance of occurrence, 25% effect on reproduction and 10% effect on survivability and disease which had a 10% chance of occurrence with 25% effect on reproduction and 15% effect on survival. Five populations of 25 (Plot 5), 50 (Plot 2), 150 (Plot 3), 250 (Plot 1) and 350 (Plot 4) founders were subjected to these conditions. It can be argued from these that a population of 250 – 350 animals are required to maintain a stable population under the conditions specified over the model period.

2. Management implications of this are that the many small, fragmented, populations of Arabian tahr which are believed to exist in the mountains of northern Oman and the UAE may not survive if conditions are severe. Populations as small as 25 animals with two catastrophes have a Pe = 0.29 and r = 0.006, which means that there is a 29% chance of the population becoming extinct over the 100 year simulation period. Pe does not reach zero until founder populations are of the order of 150 animals.

   The second implication is that conservation effort should be concentrated upon larger populations. Many small populations are also difficult to manage because of problems of finding and monitoring them. There is also anecdotal evidence that some small populations, once discovered by hunters, are being wiped out or depleted by using the Tahrs dependence

upon water to trap or ambush them at, or on the way to the waterholes. So where resources are limited conservation action should centre on larger populations.

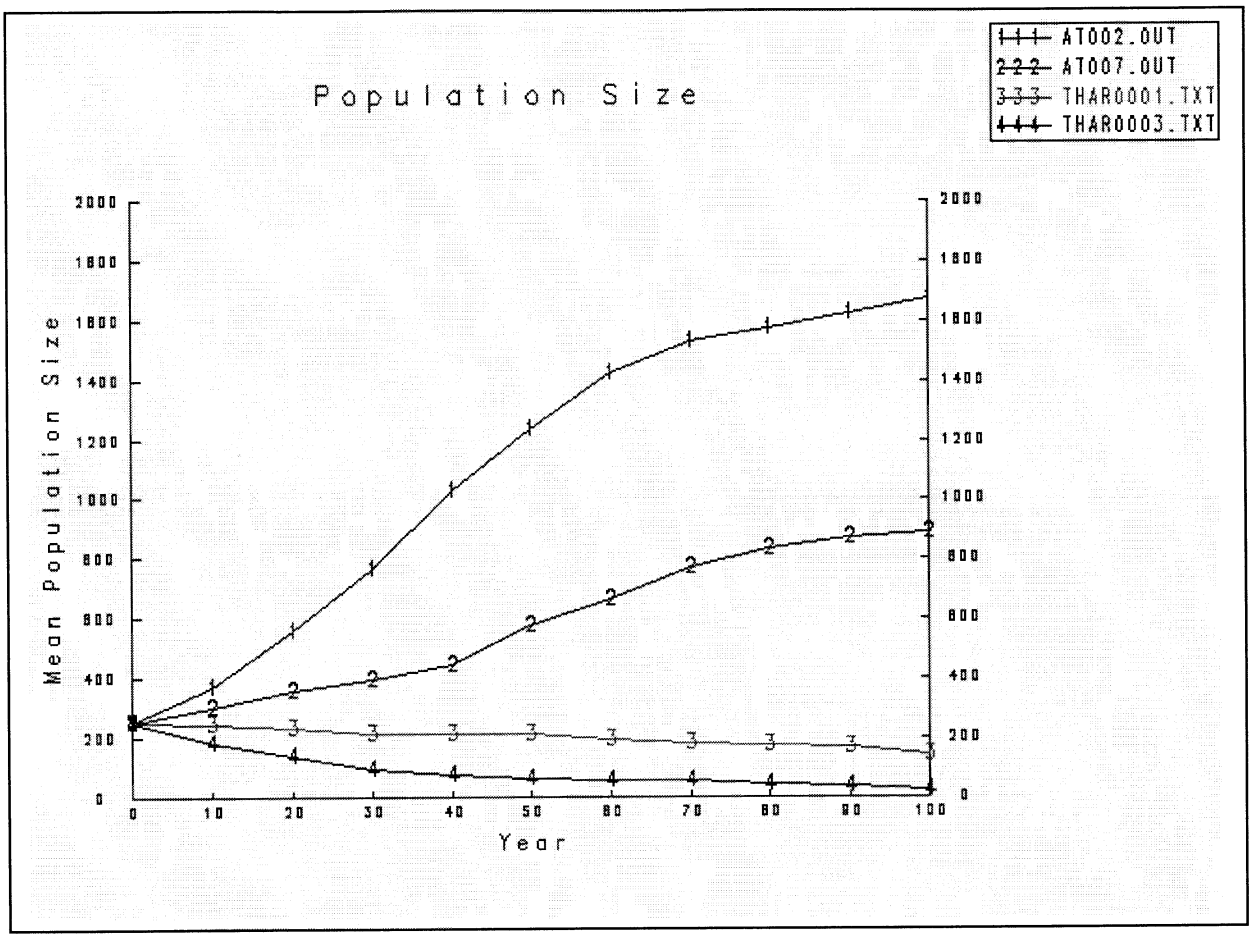
A problem arises here because if, as local people assert, the Arabian tahr migrates from one area to another or from one population to another then it may be possible to consider that the population of the mountains of northern Oman and of the UAE is not many sub-populations but one population. In order to understand fully the ecology of the tahr we must understand its migration patterns and the extent to which the population may be considered to be one or many. This also has implications for disease transmission and for the degree of inbreeding.

3. In general Vortex simulation show that populations of tahr are able to sustain themselves in conditions where a drought takes place every four years or so with a loss of 30% of reproduction and a ten percent reduction in survival across all age classes. Although with no catastrophes the population level rose to its maximum carrying capacity after about 35 years, the population simulated to experience regular drought showed a steady growth ($r = 0.021$ with $N= 1329$) where the carrying capacity was 1790 animals.

   However a second catastrophe modelled as a disease epidemic occurring once every ten years resulting in a loss of 25% of the reproductive success and a 15% reduction in survival of all age classes plus a slight enhancement of the female mortality to 9% led to the possibility of extinction with $Pe = .02$ (two chances in 100 of extinction taking place over 100 years), and a negative $r = -.0028$. Nevertheless $N = 359$. Under these circumstances the simulations showed a high degree of volatility. The implications are that two catastrophic factors working together lead to an unstable and unpredictable growth or decline in populations' levels.

   The management implication is that stringent measures need to be taken to avoid tahr populations being exposed to a second catastrophe. Since regular droughts are an inevitable catastrophe which it impossible to prevent and difficult to ameliorate, it is important to take early action to prevent or stop onset of other catastrophes such as hunting and disease epidemics.

4. Vortex simulations showed that tahr populations are generally highly resilient under normal conditions which are defined to encompass a once in four years drought, and can continue to increase in numbers with adult female mortalities as high as 13% per year and with drought occurring every four years. Vortex analysis shows that even when a female adult mortality of 7% is combined with drought and disease catastrophes the population manages to show a positive increase ($r = 0.0125$ $Pe =$ Zero) Fig.3.



1. 7% mortality in females and one catastrophe. 30% mortality in 0-1
2. 7% mortality in females and two catastrophes. 30% mortality in 0-1
3. 7% mortality in females and one catastrophe. 50% mortality in 0-1
4. 7% mortality in females and two catastrophes. 50% mortality

Fig 3. demonstrates the affect kid mortality has on the overall viability of the population. Run 1 demonstrates the projected population when there is 7% mortality in females and one catastrophe (drought) and 30% mortality in the 0-1 year age group ($r = 0.0335$ Pe = 0 and N = 1673). Run 2 has a second catastrophe added but the same kid mortality in the 0-1 age group ($r = 0.0125$, Pe = 0 and N = 890). Clearly the population is capable of surviving these problems. However, when kid mortality is increased to 50% in runs 3 ($r = -0.061$, Pe = 89% and N = 15 and 4 ($r = -0.042$, Pe = 63% and N = 67) (representing 1 and 2 catastrophes respectively) the population cannot sustain itself.

The limits of this resilience are reached however when kid mortality rises to levels of 50% per year. Even when drought is the only catastrophe and the female mortality is at 7% the effect of these levels of kid mortality is to drive the population to extinction (P = 0.36 N = 51). This suggests that kid mortality has an important influence on the perpetuation of the population.

The implication is that management of the population needs to enhance the condition of females so that they successfully rear kids. This would be realised by controls on disease in the population and controls on hunting, especially of the hunting of females.

Action Plan Recommendations:

These action plans are based upon the factors clarified by the use of Vortex software as set out above. In addition there is a need for baseline work on the biology and ecology of the species which will provide information which will lead to better general management of wild populations and to help deal with pressure on populations caused by disease, hunting and drought.

In addition to the straightforward need for biological and ecological knowledge, captive breeding proposals answer a series of problems. In addition to supporting management of wild populations captive breeding projects may help provide a solution to political and administrative problems relating to the provision of animals for captive breeding institutions and private collections whilst discouraging the illegal taking of animals from the wild. Thus a number of diverse recommendations follow in order of priority.

1. Control of Communicable Diseases

Many Arabian mammals are still little known and the Arabian tahr is one of these, but as the tahr is in the family Bovidae it will tend to be vulnerable to the diseases of this family.

The Ministry of Agricultural and Fisheries of the Sultanate of Oman has undertaken a detailed study of the diseases which affect local goats and sheep. The most common diseases found are as follows:

1. PPR (Peste des Petit Ruminant) (also known as small ruminant rinderpest).
2. CCPP (Contagious caprine pleuro-pneumonia).
3. FMD (foot and mouth disease).
4. Closteridiosis.
5. Pasteurellosis.
6. Brucellosis.

In addition, if there are outbreaks of rabies or any other disease it can be expected to be transmitted to Arabian tahr living in the mountains via domestic goats coming into contact with them.

Suggested Measures to Protect the Arabian Tahr:
The Ministry of Agriculture has put in place measures for the protection of domestic livestock against the diseases set out above. To protect specific, important populations of the Arabian tahr it is important to ensure that the flocks and herds in the surrounding area containing tahr have been subject to these measures. These measures are as follows:

1. Vaccination programme against five diseases undertaken annually (brucellosis excepted).
2. De-worming against tapeworm, helminths, and other external and internal parasites.
3. Blood samples should be taken every six months to ensure that no Brucellosis is present. If animals show a positive test they should be destroyed.

4. Control of insects, which are disease vectors in the vicinity of the homestead or in the areas where the goats spend the night.

Administrative Measures in The Sultanate of Oman and the UAE.
It is recommended that a joint committee be set up between the Ministry of Agricultural and Fisheries, The Ministry of Environment and Regional Municipalities, The Ministry of the Interior and the Police. The objective of the committee will be to protect wildlife through administrative and legal measures as the need arises. Protection is available under Federal Environmental Law 24/1999 Art. 64.1. This law also provides a framework under which areas may be protected and which provides protection against hunting, capture and disturbance in protected areas. Protected areas remain to be designated. There is also a general hunting ban outside the "hunting triangle" in Dubai, Abu Dhabi and Al Ain, but even here hare may not be hunted.

Identifying organisations and individuals that can give specialist advice on the management of the tahr. (eg CBSG, IUCN, Word Wide Fund for Nature.)

2. Measures to Monitor and Control Hunting

In northern Oman a ranger force already exists which is based in the Wadi Sarin Wildlife Reserve and which visits a large number of sites where tahrs are found or have been known to exist. There is a need to expand this force and improve its morale. At present rangers are paid only about 100 Omani Rials per month, which is inadequate recompense for the demanding work they do and the responsibilities they have and the interpersonal skills that are required of them.

A ranger force needs to:

- Gather information from local people on the presence of tahr;
- Gather information from local people on hunting activities in the area;
- On the basis of careful observation look for signs of hunting in mountain areas especially at waterholes and routes to waterholes used by tahr;
- Spread information on the importance of the tahr and the undesirability and illegality of hunting the animal;
- Liase with the authorities in the apprehension of offenders.
- To monitor a number of smaller tahr populations to assess if they persist and if not whether or not there failure is due to poaching.

Recommendations:

- That the Ministry of Environment and Regional Municipalities revise the running of its ranger force with a view to expanding its capacity and improving its morale and remuneration.
- That a similar force be set up in the UAE under the responsibility of ...
- A system of liaison be developed between tahr specialists in the UAE and those in Oman to convey information on the movements of live and dead tahr across borders and information on hunters active in the border areas.

3. Migration

A study needs to be undertaken of all aspects of migration including the tagging of animals, radio tracking or satellite tracking. Work should include ascertaining the factors which lead to animals migrating and the implications for migratory populations of tahr and of the populations into which they migrate.

The Ministry of Environment and Regional Municipalities in the Sultanate of Oman in association with a competent external agency such as the World Wildlife Fund should take the lead, to provide the expertise required and perhaps some funding.

4. Baseline Data And Research Objectives

Literature surveys to identify gaps in information, which should be filled by undertaking the following, research on Habitat Ecology and Population Ecology.

A. Habitat Ecology

- Dietary requirements.
  To identify suitable forage species throughout the range in order to promote protection and/or increase of this species.
- Competition.
  The extent of interspecific competition with both livestock and exotic species for resources.
- Mapping of the Habitat quality.
  To determine core habitats and corridors for possible inclusion in a protected area network
- The above data to be used to estimate population size.
  By determining the carrying capacity of the general habitat (known) in order to determine the possible overall population throughout the range

THE ABOVE CAN BE ACHIEVED BY IMPLEMENTING THE FOLLOWING ACTION PLANS.

- Baseline study of Habitats (Range state collaboration):
  ~ Habitat studies of presently inhabited sites.
  ~ Habitat studies of sites previously inhabited by Tahr.
- Identification all threats, local and regional, in areas previously and presently inhabited by Tahr. This may indicate why Tahr have disappeared from one of two areas which otherwise appear similar, and identify possible threats facing existing populations.
  These threats (as identified by CAMP) were:
  Fragmentation
  Hunting/trade
  Disease
  Drought
  Lack of local awareness

Interspecific competition with both livestock and exotic species for grazing resource.

B. Population Ecology

- Migration & Local movements.
- Population Structure.
  To determine the sex and age ratios in groups and how this effects range and movement during Drought, breeding and after recruitment. This will also determine generation time, life expectancy and age and sex specific mortality and fecundity for modelling the population.

ACTION PLANS

- RADIO AND SATELLITE TRACKING SURVEYS (RANGE STATE COLLABORATION):
  ~IN KNOWN POPULATIONS.
- Translocation of animals to suitable habitat (surveyed as above) and monitoring of these animals.
- Survey of local people for anecdotal information. (e.g. Tahr guards.)

NOTES:
Responsibility: Ministry of Environment and Regional Municipality of the Sultanate of Oman.

Suggest additional study on Jebel Hafit as an isolated population/ Jebel Akdar (known habitat range as a controlled study).

Tie in research with proposals from other CAMP working groups such as disease, which, may help to explain the absence of Tahr from suitable habitats.

5. The Maintenance of Captive Populations.

The maintenance of captive populations is necessary in order to meet the long - term goal of maintaining viable population(s) of Arabian tahr in the wild in range states.

A group to be established to partake in discussions until such time as a consensus for action is reached amongst the parties involved. Initially the following ideas will be addressed:

1. To preserve the genome in and outside the region in the event of a catastrophic decline in the wild population. Outputs are:

   a) To augment the collection of Arabian tahr at the Omani Mammals Breeding Centre to be of sufficient size to allow the loan or exchange of animals to selected institutions.

   b) To identify institutions in range states and also outside the Arabian Peninsula suitable for the establishment of captive populations.

   c) To draft guidelines and protocols for loan agreements with other institutions.

2. To support programmes for education and public awareness relating to wild populations. Outputs are:

a) To exhibit live specimens in or as near to natural surroundings as possible.
b) To make available to education establishments, the media and the public, information materials concerning captive breeding for conservation.
c) To arrange visitor programmes to the captive facility.
d) To design and implement *in situ* conservation training.
e) To support re-introduction programmes.

(Note: only in the event that translocation is not possible or following catastrophic collapse of the wild population.)

3. To provide relevant husbandry/biological data to reintroduction programmes. Outputs are:

a) To make available suitable animals for release.
b) To provide follow-up or other support where requested.
c) Facilitate baseline research in support of managing wild populations.

5. To collaborate with appropriate research bodies. Outputs are:

a) Work with authorities responsible for the management of wild populations and their habitats.
b) To develop protocols for examination of captive animals.
c) To make available the results of research.
d) To participate, in full, in species studbooks.
e) To provide refuge for wild casualties.
f) Provide housing and supportive care.
g) To rehabilitate animals and return them to the wild where appropriate.

Legislative and Administrative Measures: the enforcements of national laws and international agreements is necessary to meet the goals and actions set out above. Specific outputs would be:

- Review of existing laws and agreements.
- Encourage range states to enforce existing laws and agreements.
- Encourage range states to ratify and enforce existing wildlife conventions, especially CITES and the Bonn Convention.

Additional Captive Breeding Projects:

- Artificial Insemination: mature male semen should be collected and evaluated and stored in liquid nitrogen. These measures may be useful in emergencies should tahr numbers decline drastically for any unforeseen reasons.

- General research in the field of biology, genetics, behaviour.

APPENDIX: Vortex Input and Output Files.

Arabian Tahr Populations Simulations
Vortex 8

Initially four (4) populations were compared; this to determine the affect of kid mortality (in the age class 0 – 1) and catastrophes on the population viability. All environmental values and population parameters remained consistent (Appendix 1), with only kid mortality in the age class referred to above fluctuating. Each scenario was completed twice with a second catastrophe (disease) being added to that of drought.

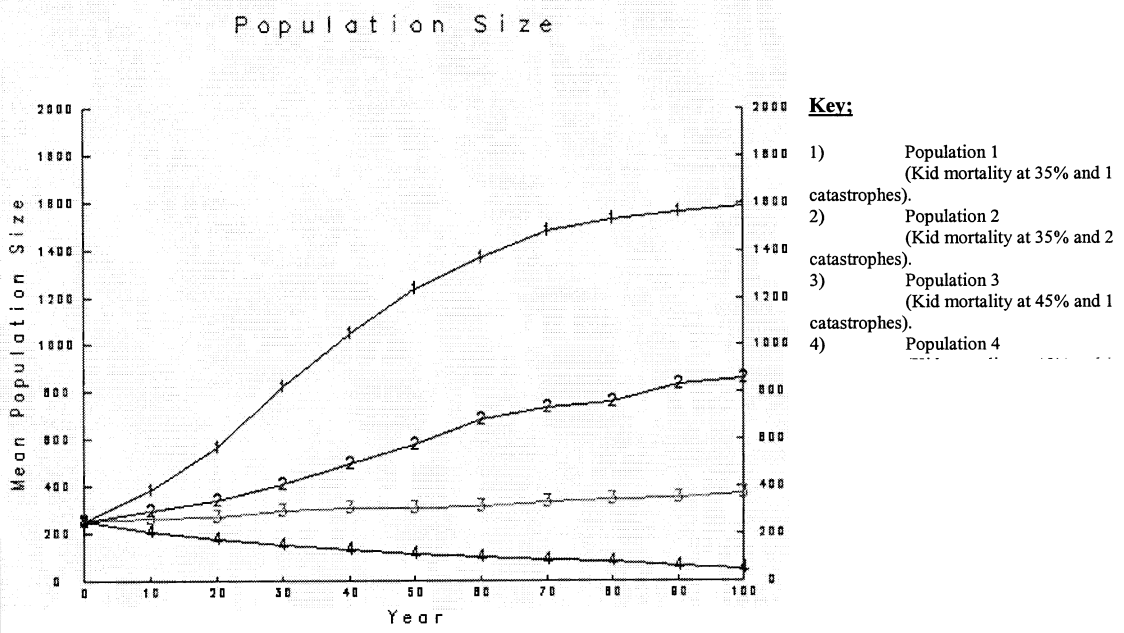


Figure 1: Population viability as determined by kid mortality between the ages of 0 –1 and the number of catastrophes.

A second series of scenarios (Appendix 2) was then run to determine the minimum viable population size. Population 2 was identified as the one, which best reflects the situation in the wild, at present and was subsequently used as a base from which the other populations were modelled. Another four scenarios were completed using those parameters with starting population being the only change.

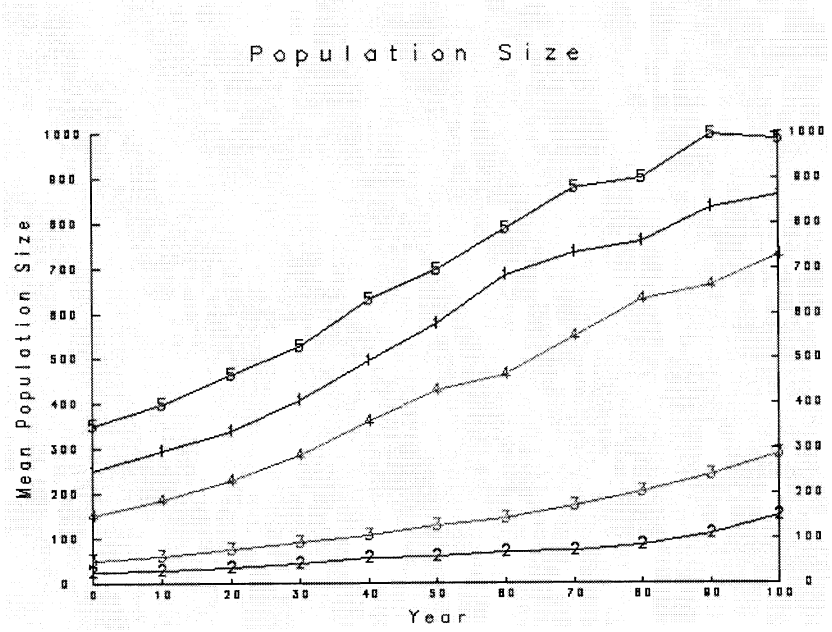


Figure 2: Minimum Viable Population

Figure 1 Parameter Values

Parameters & Environment Values	Pop. 1	Pop.2	Pop.3	Pop. 4
Graphing File	Y	Y	Y	Y
Details each Iteration	N	N	N	N
Simulations	100	100	100	100
Years	100	100	100	100
Reporting Interval	10	10	10	10
Definition of Extinction	0	0	0	0
Populations	1	1	1	1
Inbreeding Depression	N	N	N	N
EV Concordance between repro & surv?	N	N	N	N
No of Catastrophes	2	2	2	2
Social Structure	POLYG	POLYG	POLYG	POLYG
Breeding Age (Fe)	2	2	2	2
Breeding Age (M)	3	3	3	3
Max. Breeding age	10	10	10	10
Sex ratio (% M)	50%	50%	50%	50%
Max. Litter size	1	1	1	1
Density Dependant Breeding	N	N	N	N
Breeding	90%	90%	90%	90%
EV-Breeding	5%	5%	5%	5%
Mort. Fe (0- 1)	35%	45%	35%	45%
SD	8%	11%	8%	11%
Mort Fe (1- 2)	25	25	25	25

SD		6%	6%	6%	6%
Adult Females		7%	7%	7%	7%
SD		2%	2%	2%	2%
Mort M (0 – 1)		35%	45%	35%	45%
SD		8%	11%	8%	11%
Mort. M (1 – 2)		25	25	25	25
SD		6%	6%	6%	6%
Mort. M. (2 – 3)		10%	10%	10%	10%
SD		2%	2%	2%	2%
Adult Males		7%	7%	7%	7%
SD		2%	2%	2%	2%
Catastrophe 1:	Probability	25%	25%	25%	25%
	Severity – Reproduction	0.7	0.7	0.7	0.7
	Severity - Survival	0.9	0.9	0.9	0.9
Catastrophe 2:	Probability	-	10%	-	10%
	Severity – Reproduction	-	0.75	-	0.75
	Severity - Survival	-	0.85	-	0.85
All Males Breeders		N	N	N	N
Answer – A – Known?		Y	Y	Y	Y
Percent Males in Breeding Pool		80%	80%	80%	80%
Stable Age Distribution		Y	Y	Y	Y
Initial Population Size		250	250	250	250
K		1760	1760	1760	1760
SD – K		0.00	0.00	0.00	0.00
Trend in K		N	N	N	N
Harvest		N	N	N	N
Supplement		N	N	N	N

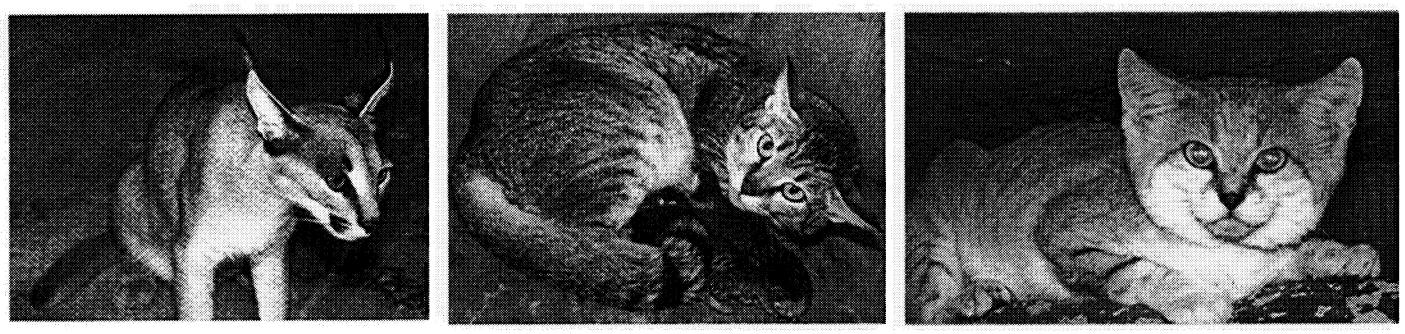
Figure 2 Parameter Values

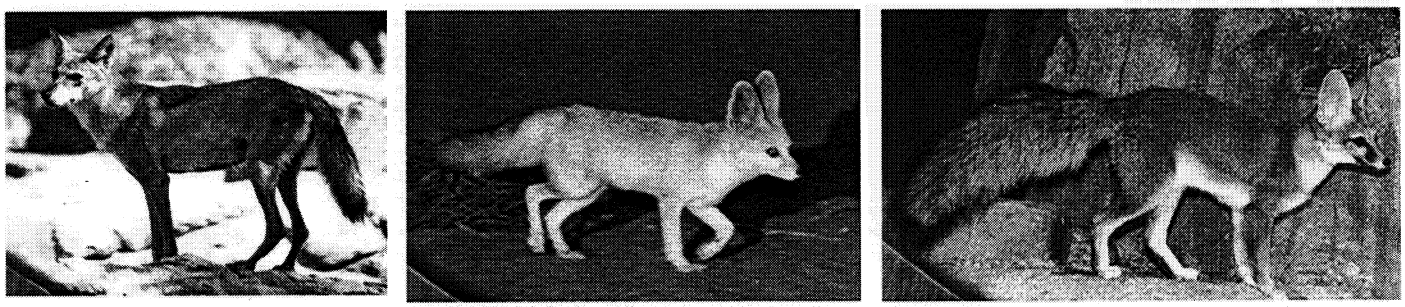
Parameters & Environment Values	Pop. 2	Pop. 5	Pop. 6	Pop. 7	Pop. 8
Graphing File	Y	Y	Y	Y	Y
Details each Iteration	N	N	N	N	N
Simulations	100	100	100	100	100
Years	100	100	100	100	100
Reporting Interval	10	10	10	10	10
Definition of Extinction	0	0	0	0	0
Populations	1	1	1	1	1
Inbreeding Depression	N	N	N	N	N
EV Concordance between repro & surv?	N	N	N	N	N
No of Catastrophes	2	2	2	2	2
Social Structure	POLYG	POLYG	POLYG	POLYG	POLYG
Breeding Age (Fe)	2	2	2	2	2
Breeding Age (M)	3	3	3	3	3
Max. Breeding age	10	10	10	10	10
Sex ratio (% M)	50%	50%	50%	50%	50%
Max. Litter size	1	1	1	1	1
Density Dependant Breeding	N	N	N	N	N

Breeding		90%	90%	90%	90%	90%
EV-Breeding		5%	5%	5%	5%	5%
Mort. Fe (0- 1)		35%	35%	35%	35%	35%
SD		8%	8%	8%	8%	8%
Mort Fe (1- 2)		25	25	25	25	25
SD		6%	6%	6%	6%	6%
Adult Females		7%	7%	7%	7%	7%
SD		2%	2%	2%	2%	2%
Mort M (0 – 1)		35%	35%	35%	35%	35%
SD		8%	8%	8%	8%	8%
Mort. M (1 – 2)		25	25	25	25	25
SD		6%	6%	6%	6%	6%
Mort. M. (2 – 3)		10%	10%	10%	10%	10%
SD		2%	2%	2%	2%	2%
Adult Males		7%	7%	7%	7%	7%
SD		2%	2%	2%	2%	2%
Catastrophe 1:	Probability	25%	25%	25%	25%	25%
	Severity – Reproduction	0.7	0.7	0.7	0.7	0.7
	Severity - Survival	0.9	0.9	0.9	0.9	0.9
Catastrophe 2:	Probability	10%	10%	10%	10%	10%
	Severity – Reproduction	0.75	0.75	0.75	0.75	0.75
	Severity - Survival	0.85	0.85	0.85	0.85	0.85
All Males Breeders		N	N	N	N	N
Answer – A – Known?		Y	Y	Y	Y	Y
Percent Males in Breeding Pool		80%	80%	80%	80%	80%
Stable Age Distribution		Y	Y	Y	Y	Y
Initial Population Size		250	25	50	150	350
K		1760	1760	1760	1760	1760
SD – K		0.00	0.00	0.00	0.00	0.00
Trend in K		N	N	N	N	N
Harvest		N	N	N	N	N
Supplement		N	N	N	N	N

```
TAHR001.OUT     ***Output Filename***
Y     ***Graphing Files?***
N     ***Details each Iteration?***
100     ***Simulations***
100     ***Years***
10     ***Reporting Interval***
0     ***Definition of Extinction***
1     ***Populations***
N     ***Inbreeding Depression?***
N     ***EV concordance between repro and surv?***
3     ***Types Of Catastrophes***
P     ***Monogamous, Polygynous, or Hermaphroditic***
2     ***Female Breeding Age***
3     ***Male Breeding Age***
14     ***Maximum Breeding Age***
50.000000     ***Sex Ratio (percent males)***
1     ***Maximum Litter Size (0 = normal distribution) *****
N     ***Density Dependent Breeding?***
Pop1
100.00  **breeding
5.00  **EV-breeding
50.000000  *FMort age 0
10.000000  ***EV
33.000000  *FMort age 1
8.000000  ***EV
7.000000  *Adult FMort
2.000000  ***EV
50.000000  *MMort age 0
10.000000  ***EV
33.000000  *MMort age 1
8.000000  ***EV
33.000000  *MMort age 2
8.000000  ***EV
5.000000  *Adult MMort
2.000000  ***EV
10.000000     ***Probability Of Catastrophe 1***
0.500000     ***Severity--Reproduction***
1.000000     ***Severity--Survival***
20.000000     ***Probability Of Catastrophe 2***
1.000000     ***Severity--Reproduction***
0.950000     ***Severity--Survival***
25.000000     ***Probability Of Catastrophe 3***
0.700000     ***Severity--Reproduction***
0.900000     ***Severity--Survival***
N     ***All Males Breeders?***
Y     ***Answer--A--Known?***
90.000000     ***Percent Males In Breeding Pool***
Y     ***Start At Stable Age Distribution?***
250     ***Initial Population Size***
1790     ***K***
0.000000     ***EV--K***
N     ***Trend In K?***
N     ***Harvest?***
N     ***Supplement?***
Y     ***AnotherSimulation?***
```

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP)
FOR
ARABIAN CARNIVORES
&
POPULATION AND HABITAT VIABILITY ASSESSMENT (PHVA)
FOR THE
ARABIAN LEOPARD AND TAHR





SECTION 6

Species Taxon Data Sheets and Distribution Maps

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Bdeogale crassicuda*	Peters	1852
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date

1B. Family: Herpestidae

1C. CommonNames: Bushy Tailed Mongoose (English)
Nims Katheef Al-Thail (Arabic)

1D.Taxonomic level: Species

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: ? Foothills

2C. Niche:

2D. Historical distrib: Unknown

2E. Current countries: Yemen

2F. Current regional: Only in Yemen

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: 101-5,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: 501-2,000 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute

5A. Population Locations are: Contiguous
Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☐
If yes, describe:

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): over how many years:
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change:

6E. Is there any change in the quality of the habitat where the taxon occurs ☐
If yes, Describe:

6F. State primary cause of change:

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced	Present	Future	Decline	Notes on future threat
Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐
Notes: Poisoning and Road kills are present threats resulting in some decline in the population.

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) < 250

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Possibly Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☐ Field study ☐ Museum records ☑ Informal sightings ☑ Literature ☐ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics

Part Two

13. Status

13A. IUCN Status: Critically endangered Based on: C2b

13B. Cites: Unknown 13C. Natl wildlife Legislation None

13D. Natl Red Data Book: No 13E. Intl Red Data Book Unknown

13F. Other legislation:

13G. Protected area presence:

13H. Endorsed protection plan:

Notes: Population is less than 250 individuals , all in a single subpopulation

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:

☐ Genetic research ☐ Taxonomic research ☑ Life history
☑ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☑(Yes)

Notes:

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☑ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☐ Public awareness ☐ Address policy makers ref needs of local people
☐ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes:

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☐ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☐ (Yes)

17A. Names of facilities:

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
0	0	0	0	☑

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries

18. Level of ex situ management recommended

Initiate ex situ program within 3 years

19. Are techniques extablished to propagate the taxon:

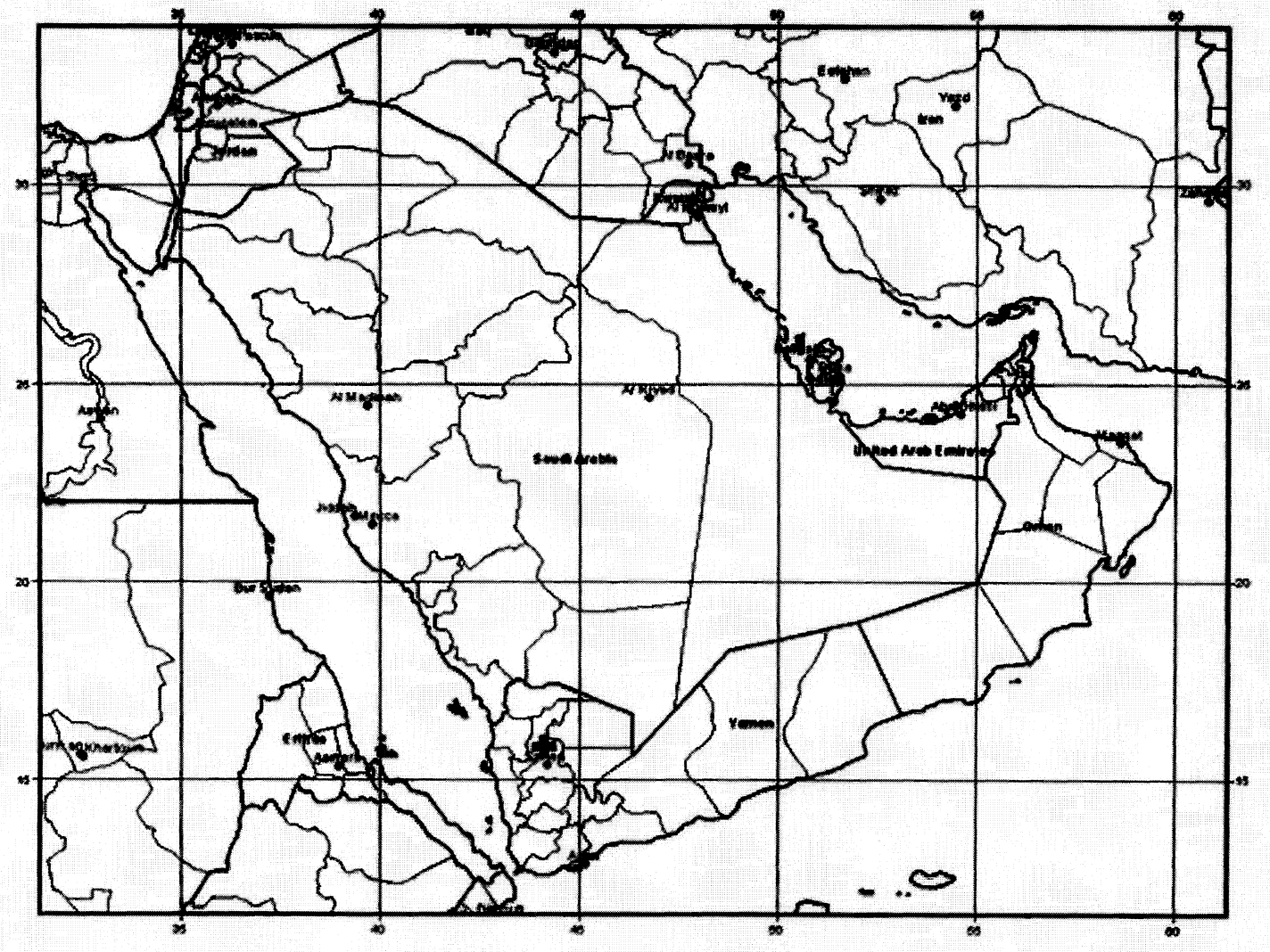
20. Other Comments:

Part Four

21. Sources: Nader & Al-Safadi, 1991
Al-Safadi- will obtain further details
The Bushy Tailed Moingoose, Bdeogale crassicouda. Peters, 1850 A new record for the Arabian Peninsula (Mammalia:Carnivora:Herpestidae) Zoologischer Anzeigen 22b(3/4):202-204

22. Compilers Patrick Paillat, Philip Seddon, Iyad Nader, Reza Khan, Peter McKinney, Peter Phelan, Robert Llewellyn-Smith, Mike Smith, Christopher Drew, Gary Feulner

23. Reviewers



Bushy Tailed Mongoose

✚ Nader & Safadi (Al-) (1991) Collected Specimen (dead)

● Cities

N
W E
S

300 0 300 600 900 1200 1500 1800 Kilometers

Mapping by GIS Unit
Environmental Reserach & Wildlife Developent Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

Canis aureus — **jackal, ibn awa**

1.Scientific Name:	*Canis aureus*	Linnaeus	1758
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date

1B. Family: Canidae

1C. CommonNames:

Asiatic jackal	English
common jackal	English
Golden jackal	English
ibn awa	Arabic

1D.Taxonomic level: Species

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Gravel, scrubland, cultivated areas

2C. Niche:

2D. Historical distrib: Isolated pockets throughout Saudi Arabia A. L. Jawf, Hufof, 1926

2E. Current countries: Saudi Arabia & (Iraq)

2F. Current regional: Saudi Arabia- eastern province

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence) Saudi Arabia

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: 501-2,000 sq km

Notes (Occupancy) Saudi Arabia- Jubail Marine Sanctuary

5. No. of Locations or Subpopulations in which the taxon is distribute
2- fragmented

5A. Population Locations are: Fragmented

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☐
If yes, describe: Unknown

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): over how many years:
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): < 20% over how many years:

6D. State primary cause of change: Increased agriculture- Al Jauf

6E. Is there any change in the quality of the habitat where the taxon occurs ☐
If yes, Describe: Unknown

6F. State primary cause of change:

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced interspecific competition	☑	☑	☑	
Catastrophic				

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐
Notes: Human Interference threats, present and future, harvest and hunting, poisoning and road kills.

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unk.

9B. Regional Population Low, 1 confirmed

9C. Number of Mature Individuals (all populations) < 250

9D. Generation time

10. Population trends

10A. Trends in Pop size: Declining

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☐ Field study ☐ Museum records ☑ Informal sightings ☐ Literature ☐ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
None			

Part Two

13. Status

13A. IUCN Status: Vulnerable Based on: C1 D1

13B. Cites: III 13C. Natl wildlife Legislation

13D. Natl Red Data Book: 13E. Intl Red Data Book

13F. Other legislation:

13G. Protected area presence: Jubail Marine Sanctuary

13H. Endorsed protection plan:

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:
☑ Survey studies ☐ Genetic research ☐ Limiting factor research ☐ Taxonomic research ☐ Epidemiology ☐ Life history ☐ Trade

Othes (taxon specific) KSA- presence, eastern province focus, spotlighting.

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes:

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☑ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes: Monitoring- continued presence in Jubail protected area.
Education- emphasize difference with wolf.
Captive breeding could be done for public awareness but not currently in KSA collections, low priority.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Alain Zoo, Abu Dhabi, UAE Breeding Centre for Endangered Arabian Wildlife, Sharjah, UAE

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
0	0	0	14	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries No because of too little information

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments:

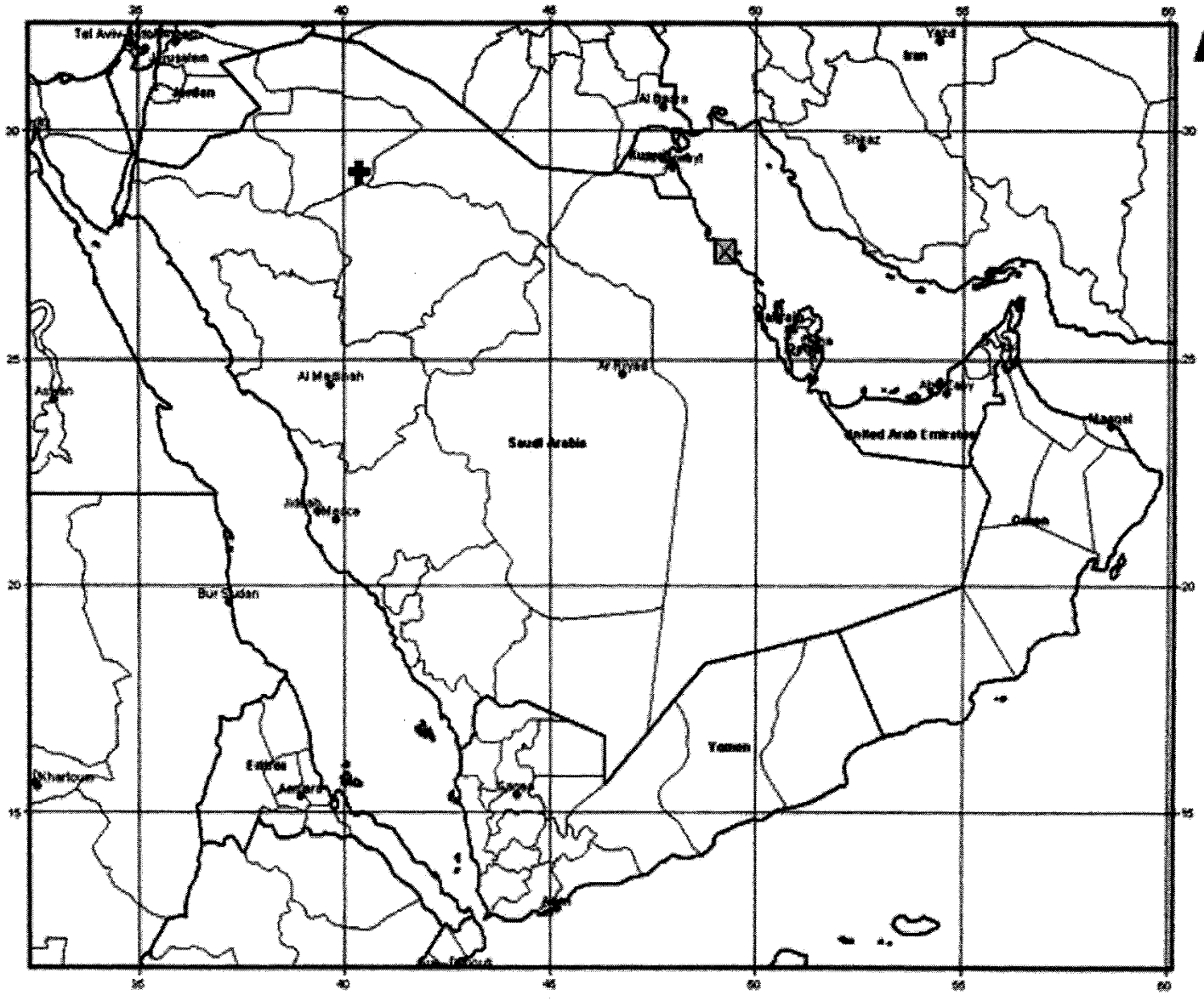
Part Four

21. Sources:

Nader- 1996
Harrison and Bales- 1991
Gasperetti- 1985
NCWD- unpublished
Kingdon, J. (1991): Arabian Mammals: A Natural History. Academic Press, London, U.K. page 76
Roberts, T.J. (1997) The Mammals of Pakistan, Oxford University Press. Pages 140-143
Internet- http://www.gisbau.uniroma1it/amd/amd085.html

22. Compilers Patrick Paillat, Reza Khan, Robert Llewellyn-Smith, Mike Smith, Christopher Drew, Iyad Nader, Peter Phelan, Philip Seddon, Peter McKinney, Gary Feulner

23. Reviewers



Asiatic Jackal

(Canis aureus)

NCWCD (obs.) 1990's

Sighting, 1983 (Gasparetti, 1985)

Cities

N

W E

S

500 0 500 1000 1500 Kilometers

Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Canis lupus arabs*	Pocock	1934
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
1B. Family:	Canidae		
1C. CommonNames:	Arabian wolf Theeb	English Arabic	
1D.Taxonomic level:	Subspecies		

2. Distribution of the Taxon

2A.Life form (plant):	
2B. Habitat:	
2C. Niche:	All Arabian peninsula habitats except sand desert
2D. Historical distrib:	Saudi Arabia, Yemen, Oman, UAE except Rub al Khali region
2E. Current countries:	Saudi Arabia, Yemen, Oman
2F. Current regional:	
2G Migration regions:	

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute
2- Oman and Saudi Arabia/Yemen

5A. Population Locations are: Fragmented

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe:

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): < 20% over how many years:
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change: Urban Development

6E. Is there any change in the quality of the habitat where the taxon occurs ☐
If yes, Describe:

6F. State primary cause of change:

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced hybridization	☑	☑	☑	Small extent
Catastrophic				

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Harvest/Hunting, Poisoning, Road kills- all are present and future threats and all may result in decline

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☑ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade: Live animal

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline
None

9. Population number

9A. Global Population

9B. Regional Population Saudi Arabia- less than 800; UAE-0 ; not known

9C. Number of Mature Individuals (all populations) < 2,500

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Declining

10B. Rate of decline:. <20% Period of decline 25 years

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☑ Field study ☐ Museum records ☑ Informal sightings ☐ Literature ☐ Hearsay/belief

Notes: Field studies in Saudi Arabia

12. Recent Field Studies

Researcher names	Location	Dates	Topics
NCWCD	Taif and Southwest Saudi Arabia	1986 to present (2000)	General Survey
NCWCD	Entire Saudi Arabia	1999 to present (2000)	General Survey
NCWCD	Harrat al Harra	1993- 1996	General Survey

Part Two

13. Status

13A. IUCN Status: Vulnerable Based on: C1&2

13B. Cites: II 13C. Natl wildlife Legislation

13D. Natl Red Data Book: No 13E. Intl Red Data Book Not Listed

13F. Other legislation: No

13G. Protected area presence: Saudi Arabia- Harrat al Harrah; Al-Tubay; Al Khurfah; Raydah; Majam al-Hadb; Ibex Reserve Oman- White Oryx Sanctuary

13H. Endorsed protection plan:

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:

☑ Genetic research ☑ Taxonomic research ☑ Life history
☑ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes:

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☑ Monitoring ☑ Work in local communities
☐ Sustainable utilization ☑ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes: Compensation for livestock depradation

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other Survey studies- KSA- general surveys, questionarres & sign, late trapping (leghold) and blood

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Dubai Zoo- UAE; BCEAW Sharjah, UAE; Seeb- Bait al Baraka, Oman; Taif, Hafer al Batin, Riyadh, Saudi Arabia

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
0	0	0	0	☑

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments:

Part Four

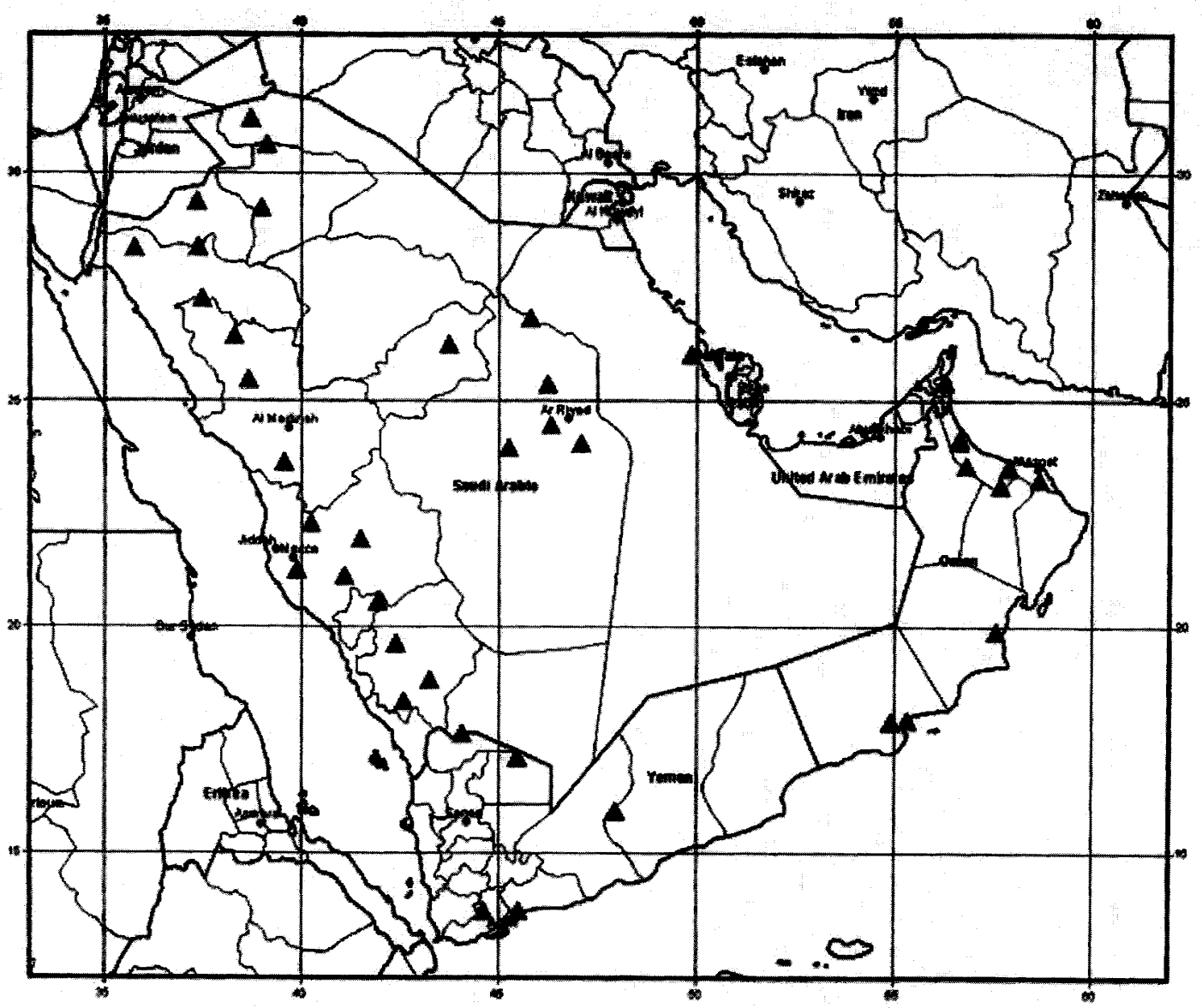
21. Sources: Harrison and Bates (1991)
Nader (1980)
Gasperetti (1985)
Nader (1990)
McDonald and Ginsberg (1990)
NCWCD unpublished

22. Compilers Philip Seddon, Patrick Paillat, Iyad Nader, Peter Phelan, Robert Llewellyn-Smith, Peter McKinney, Mike Smith, Chris Drew, Gary Feulner, Reza Khan

23. Reviewers

Arabian Wolf

(Canis lupus arabs)



▲ Confirmed Locations
NCWCD data.
Fisher et al 1999,
Seddon et al 1997,
Gasparetti 1985,
Nader 1996

● Cities

N
W E
S

500 0 500 1000 1500 Kilometers

Mapping by GIS Unit
Environmental Reserech & Wildlife Development Agency
PO Box 45553
Abu Dhabi
UAE

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Caracal caracal schmitzi*	Matschie	1912
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Felis caracal	Schreber	1776

1B. Family: Felidae

1C. CommonNames:

Al Khanaq	Arabic
Al Washaq	Arabic
Anaq al Ardh	Arabic
Caracal lynx	English
Desert lynx	English
Khuwainga	Arabic
Red lynx	English
Tiffa	Arabic

1D.Taxonomic level: Subspecies

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Vegetated sand dunes, Gravel plains, Mountains, Coastal plains. Absent from sand desert.

2C. Niche: Generalist present from sea level to 3000 meters.

2D. Historical distrib: Throughout Arabian peninsula except in Qatar and Bahrain.

2E. Current countries: Yemen, Oman, Saudi Arabia, United Arab Emirates, Kuwait.

2F. Current regional: Yemen, Oman, Saudi Arabia, United Arab Emirates, Kuwait

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence) 1.5 million square kilometers

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy) estimated to 0.5 million square kilometers

5. No. of Locations or Subpopulations in which the taxon is distribute
Unknown

5A. Population Locations are: Not known
Notes: May or may not be contiguous

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): < 20% over how many years: 50 years
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change: Human interference and killing.

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Decrease in quality

6F. State primary cause of change: Human interference and killing, overgrazing and a decrease in prey base.

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced decline in prey species	☑	☑	☑	
Catastrophic				

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐
Notes: Grazing, harvest/hunting, loss of habitat, poisoning and trade for market or medicine are all regarded as present and future threats which may result in a decline in the species.

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☑ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade: Live animal

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline
None

9. Population number

9A. Global Population <5000 pairs (based on Weisbein and Mendelssohn)

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) >2500

9D. Generation time 4 years

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☑ (Yes)

If yes, specify rate: <20% Period of decline 10 years

Notes:

11. Data quality

11A. Estimates base on:

- ☐ Census or monitoring
- ☑ Indirect information
- ☑ Field study
- ☑ Museum records
- ☑ Informal sightings
- ☑ Literature
- ☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
van Heezik and Seddon	Northern Saudi Arabia	1998	Caracal range size and habitat use (see sources)

Part Two

13. Status

13A. IUCN Status: Vulnerable Based on:

13B. Cites: I

13C. Natl wildlife Legislation Oman- Ministerial decision 207/93, Royal Decree 111/96

13D. Natl Red Data Book: Oman Cr/C 2a, UAE vulnerable (from unofficial list

13E. Intl Red Data Book Least concern

13F. Other legislation:

13G. Protected area presence: Harrat al Harrah, Raidi Azir, Yaloomi Oryx Reserve

13H. Endorsed protection plan:

Notes: Category based on population estimates, less than 1000 in Oman.?

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:

☑ Survey studies ☐ Genetic research ☐ Limiting factor research ☑ Taxonomic research ☐ Epidemiology ☑ Life history ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: No PHVA is recommended.

15. Management recommendations for the taxon *Specify:*

☑ Habitat management ☐ Wild pop management ☑ Monitoring ☑ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes: 1- monitoring- capture/ release
2- public education- hunting/baiting/killing/environmental education
3-habitat management
4- work in local communities
5 captive breeding

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☐ Reintroduction ☐ Benign introduction
☑ Research ☑ Husbandry ☑ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: See studbook. Also undisclosed number in private collections in United Arab Emirates, Saudi Arabia and elsewhere.

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
12	12	2	26	☑

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries International studbook in place, 31.12.1998

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries Possible in future if population grows and Asian subspecies resolved.

18. Level of ex situ management recommended

Ongoing ex situ program intensified or increased

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments:

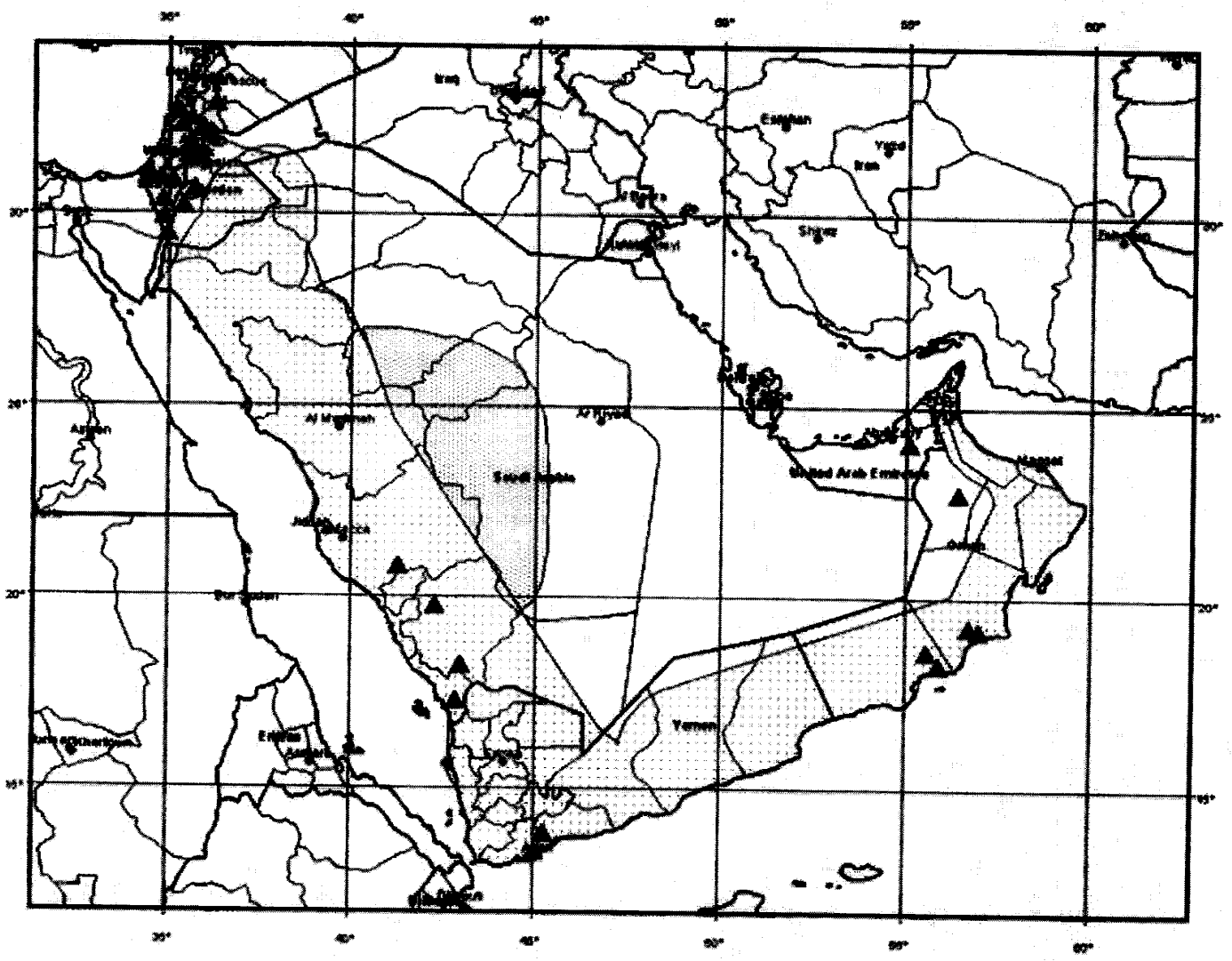
Part Four

21. Sources:

Harrison, D.L. and Bates, P.J.J. (1991): The Mammals of Arabia, 2nd Edition, Harrison Zoological Museum, Sevenoaks, U.K.
Van Heezik, Y. and Seddon, P. (1998): Range use and habitat use of an adult male caracal in Northern Arabia. Journal of Arid Environments (40): 109-112
Weisbein, Y. and Mendelssohn, H. (1990): The biology and ecology of the caracal in the Northern Ararah Valley of Israel. Cat News (12): 20-22.
Nahil Abdul Atif Abadi (1993): Wild Mammals of Yemen, Part 1.
Nowell, K. and Jackson, P. (1996): Wild Cats status, survey and conservation action plan, IUCN, Switzerland.
Versteeg, D. (1998): International Studbook for the Caracal, 31.12.1997, The Living Desert, U.S.A.
Hellyer, P. (1993): A summary of recent lynx and leopard sightings in the Northern UAE and Musandam. Tribulus (3): 11-13.

22. Compilers Alexander Sliwa, Olivia Walter, Peter Jackson, Amrita De Soyza, Teague Stubbington, Sadek Yehia Al-Osimi, Abdulrahman Khoja, Sami Abdullah Gargash, Jaap Wensvoort, Andrew Spalton, Fred Launay, Peter Wright, Ali Mohammed Albar, Hussien Al-Gunied, Ghalia al Midfa, Hana al Suwaidi, Gea Olbricht, Sean Mckeown

23. Reviewers



Caracal

(Felis Caracal)

- Caracal
- Occurances of Caracal
- Possible Occurances of Caracal
- Cities

N
W E
S

500 0 500 1000 1500 Kilometers

Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

Felis margarita harrisoni — **Sand Cat**

1.Scientific Name:	*Felis margarita harrisoni*	Hemmer, Grubb and Groves	1976
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date

1B. Family: Felidae

1C. CommonNames:	
Al Qit Al Sahrawi	Arabic
Al Qit Ramli	Arabic
Al Tiffa	Arabic
Arabian Sand Cat	English
Qit al Raml	Arabic
Sand Cat	English

1D.Taxonomic level: Subspecies

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Vegetated sand dunes, Gravel plains, Sabka (coastal and inland)

2C. Niche: 0- 1000 meters- adapted to true desert conditions

2D. Historical distrib: Throughout Arabian peninsula but not Bahrain

2E. Current countries: Throughout Arabian peninsula but not Qatar or Bahrain

2F. Current regional: Throughout Arabian peninsula but not Qatar or Bahrain

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence) > 1,500,000 square kilometers

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy) > 1,500,000 square kilometers

5. No. of Locations or Subpopulations in which the taxon is distribute

5A. Population Locations are: Fragmented
Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): <10- 20% over how many years: 50
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change: Human disturbance

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Decrease in quality

6F. State primary cause of change: Human disturbance

Notes:

7. Threats

Human interference	Present	Future	Lead to decline	Notes on future threat

Natural/man induced	Present	Future	Decline	Notes on future threat
decline in prey species	☑	☑	☑	
interspecific competition	☑	☑	☑	
predation	☑	☑	☑	

Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Grazing, Loss of habitat and Habitat fragmentation are regarded as present and future threats and may lead to population decline.

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☑ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade: Live animal

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population > 10,000 pairs

9C. Number of Mature Individuals (all populations) > 10,000

9D. Generation time 3 years

10. Population trends

10A. Trends in Pop size: Declining

10B. Rate of decline:. <20% Period of decline 50 years

10C. If stable or unknown, do you predict a future decline in population ☑ (Yes)

If yes, specify rate: Unknown Period of decline

Notes: Subpopulation numbers in 9B based on 16 square Km of male in Palestine. Estimated at 50 square Kilometers per animal.

11. Data quality

11A. Estimates base on:

☑ Census or monitoring
☑ Indirect information
☐ Field study
☑ Museum records
☑ Informal sightings
☑ Literature
☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
Abbadi- Palestine-		1992-	Ecology

Part Two

13. Status

13A. IUCN Status: Lower risk - least concern Based on: Population estimate- CODE?

13B. Cites: II 13C. Natl wildlife Legislation Oman

13D. Natl Red Data Book: Oman DD, UAE endangered 13E. Intl Red Data Book Least concern

13F. Other legislation:

13G. Protected area presence: Harrat al Harrah; Ibex Reserve; Mahazat as Sayd; NWRC Taif; Uruq Bani Ma'arid- entire Kingdom of Saudi Arabia

13H. Endorsed protection plan:

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:

☑ Survey studies ☐ Genetic research ☐ Limiting factor research ☐ Taxonomic research ☐ Epidemiology ☑ Life history ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: PHVA is not recommended.

15. Management recommendations for the taxon *Specify:*

☑ Habitat management ☐ Wild pop management ☑ Monitoring ☑ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes:

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☐ Reintroduction ☐ Benign introduction
☑ Research ☑ Husbandry ☑ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Arabia, Europe and North America

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
40	39	0	79	☐

17C. Does a coordinated species management program exist for this species: ☑ (Yes)

If yes, specify countries USA, Europe, international studbooks

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☑(Yes)

If yes, specify countries Europe

18. Level of ex situ management recommended

Ongoing ex situ program intensified or increased

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments:

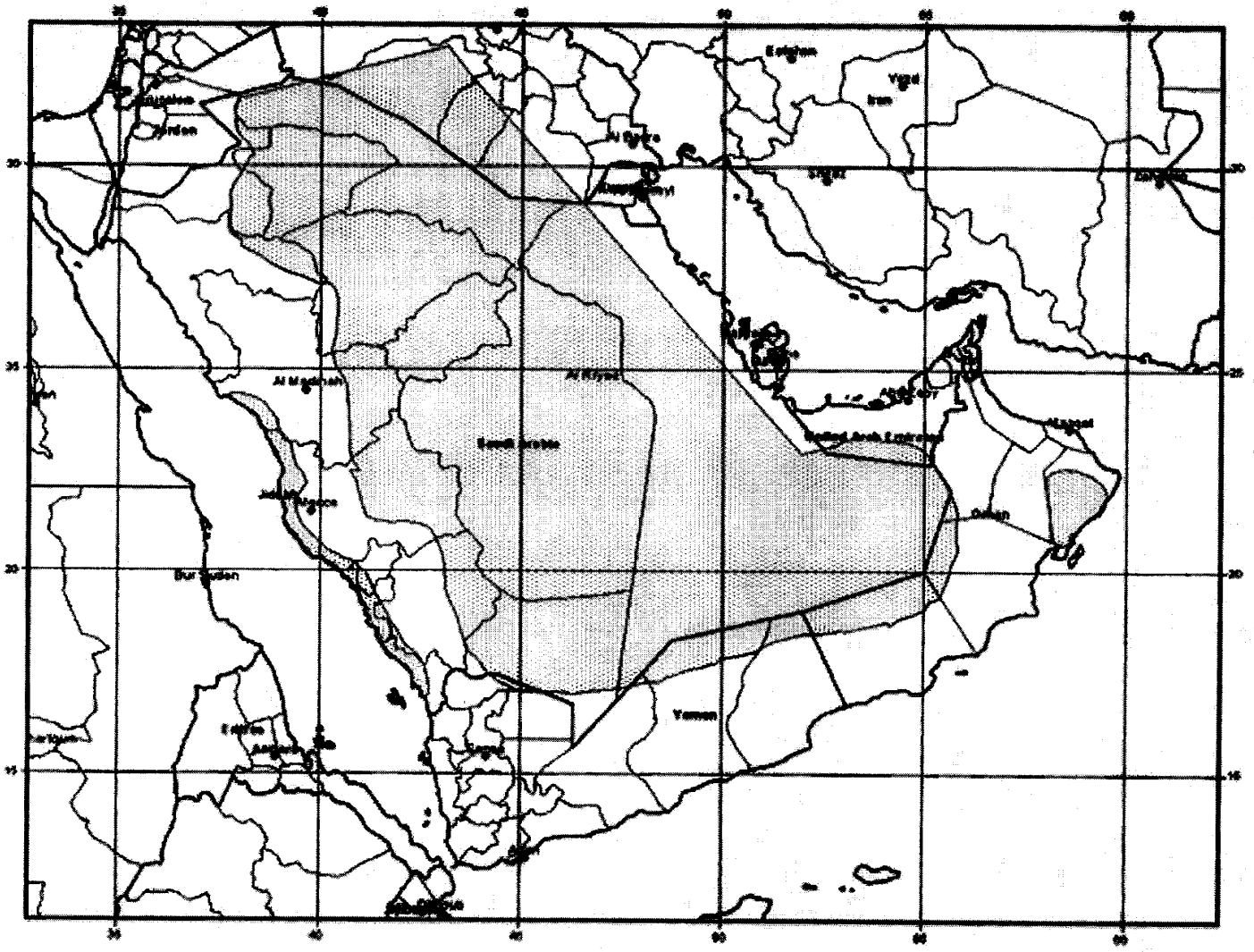
Part Four

21. Sources:

Abbadi, M. (1992): Israel's elusive feline: sand cats. Cat News (18): 15-16. Bougy-Villars, Switzerland
Nalil Abdul Atif Abadi (1993): Wild Mammals of Yemen Part 1
Harrison and Bates (1991): Mammals of Arabia, 2nd Edition. Harrison Zoological Museum, Sevenoaks, U.K.
McDonald (1996): Wildcru Report on telemetry studies in Tumamali, Saudi Arabia
Sausman, K. (1998): International Studbook for the Sandcat. 31.12.1997, The Living Desert Museum, USA,
Nowell, K. and Jackson, P. (1996): Wild Cats: Status, survey and conservation action plan, IUCN, Switzerland.

22. Compilers Sean McKeown, Gea Olbricht, Hana al Suwaidi, Ghalia al Midfa, Hussien Al-Gunied, Ali Mohammed Albar, Peter Wright, Fred Launay, Andrew Spalton, Jaap Wensvoort, Sami Abdullah Gargash, Abdulrahman Khoja, Sadek Yehia Al-Osimi, Teague Stubbington, Olivia Walter, Alexander Sliwa, Amrita De Soyza, Peter Jackson

23. Reviewers



Sandcat

(Felis margarita)

Possible Distribution of Sandcat

Cities

N
W E
S

600 0 500 1000 1500 Kilometers

Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Felis silvestris*	Schreber	1775
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	gordoni	Harrison	1968
	iraki	Cheesman	1921
	tristrami	Pocock	1944

1B. Family: Felidae

1C. CommonNames:	
African Wild Cat	English
Al Ardhi	Arabic
Al Qit Al Barre	Arabic
Al Wahshi	Arabic
Arabian Wild Cat	English
Gordon's Wild Cat	English
Land Cat	English
Wild Cat	English

1D.Taxonomic level: Species

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Gravel plain, Vegetated sand dunes, Savannah (Acacia), Mountainous regions, Wadis, Coastal regions, Temporary human settlements

2C. Niche: Sea level to 1800 meters. This species is a generalist in habitat use and is only excluded from extreme areas, for example, nonvegetated shifting sand dunes

2D. Historical distrib: Most likely all countries on Arabian peninsula but accurate data are unavailable.

2E. Current countries: Kuwait, Oman, Saudi Arabia, United Arab Emirates, Yemen, Qatar, Bahrain

2F. Current regional: Saudi Arabia not including Rub al Khali, Oman not including Wahiba Sands and Rub al Khali, United Arab Emirates not including Liwa area, Yemen not including Rub al Khali. Also excluding some land above 1800 meters.

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence) 2,000,000 square kilometers

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy) 2,000,000 square kilometers

5. No. of Locations or Subpopulations in which the taxon is distribute

Unknown

5A. Population Locations are: Not known

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑

If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area

approximate change (%): < 20% over how many years: 50

Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat

approximate change (%): over how many years:

6D. State primary cause of change: Human interference

6E. Is there any change in the quality of the habitat where the taxon occurs ☐

If yes, Describe: Unknown

6F. State primary cause of change: Human interference

Notes:

7. Threats

Human interference	Present	Future	Lead to decline	Notes on future threat

Natural/man induced	Present	Future	Decline	Notes on future threat
climate	☐	☑	☑	
decline in prey species	☑	☑	☑	
disease	☐	☑	☑	
hybridization	☑	☑	☑	
I	☐	☐	☐	
interspecific competition	☑	☑	☑	

Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Grazing, Loss of habitat, Habitat fragmentation, Poisoning and Road kills are regarded as present and future threats possibly causing a decline in the species. Pollution is regarded as a future threat.

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population 10,000 to 30,000 pairs based on home range size of

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) > 10,000

9D. Generation time 2.5 years

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☑ (Yes)

If yes, specify rate: >20% Period of decline 10 years

Notes: Habitat loss and hybridization

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☑ Field study ☑ Museum records ☑ Informal sightings ☑ Literature ☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
C. Stuart and T. Stuart	Hajar Mountains	April 1996	Survey
T. Stubbington	Sharjah, United Arab Emirates	1999- present	Ongoing telemetry studies
D. McDonald	Thummah, Saudi Arabia	1996	Wildcru report on wildcat telemetry

Part Two

13. Status

13A. IUCN Status: Lower risk - least concern Based on: CODE Basis only

13B. Cites: II

13C. Natl wildlife Legislation Oman, Ministerial Decision-207193, Royal Decree 111/96

13D. Natl Red Data Book:

13E. Intl Red Data Book

13F. Other legislation:

13G. Protected area presence: Mahazat-as-Sayd, Saudi Arabia; Ibex Reserve, Saudi Arabia, NWRC Taif, Saudi Arabia; Uruq Bani Ma'arid in Saudi Arabia

13H. Endorsed protection plan:

Notes: Population studies done in restricted areas but no detailed field studies.

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:
☑ Genetic research ☑ Taxonomic research ☑ Life history
☑ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: No PHVA recommended

15. Management recommendations for the taxon *Specify:*

☑ Habitat management ☐ Wild pop management ☑ Monitoring ☑ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☐ Genome Resource ☑ Limiting factor

Notes:

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☑ Reintroduction ☐ Benign introduction
☑ Research ☑ Husbandry ☑ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: 12 Zoos in Arabia, North America and Europe

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
25	23	0	48	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries No but there is an international studbook.

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries No not recommended.

18. Level of ex situ management recommended

Ongoing ex situ program intensified or increased

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments: More founders needed for captive population/ slight increase.
Field research needs to be prioritised.

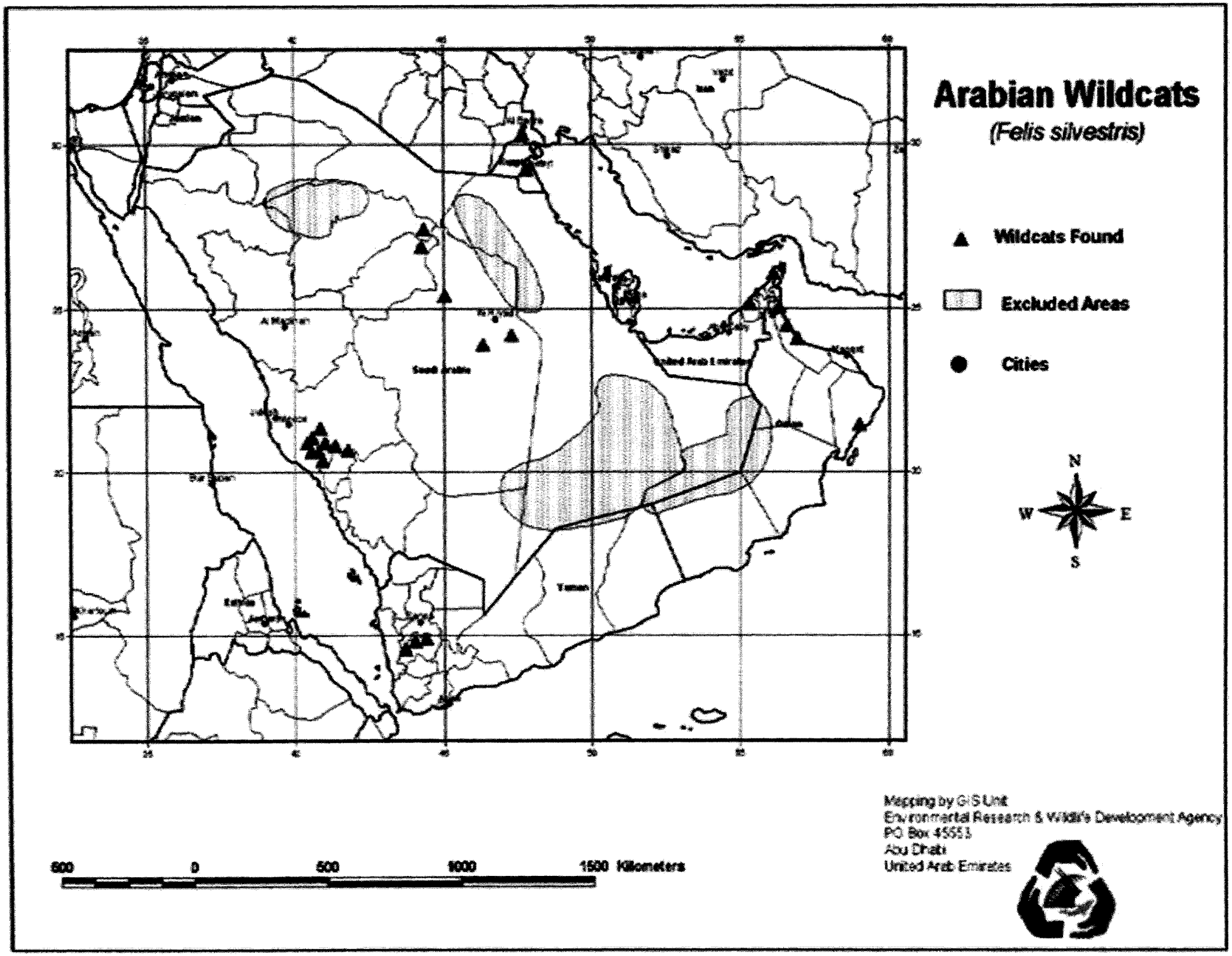
Part Four

21. Sources:

Olbricht, G. (1999): International Studbook for the Gordon's Wildcat 31.12.1998. Wuppertal Zoological Garden, Germany.
Nalil Abdul Atif Abadi (1993): Wild Mammals of Yemen Part 1
Harrison and Bates (1991): Mammals of Arabia, 2nd Edition. Harrison Zoological Museum, Sevenoaks, U.K.
McDonald (1996): Wildcru Report on telemetry studies in Thmamali, Saudi Arabia
Nowell, K. and Jackson, P. (1996): Wild Cats: Status, survey and conservation action plan, IUCN, Switzerland
Kingdon, J. (1991): Arabian Mammals: A Natural History. Academic Press, London, U.K. Pages 98-99 and 227.

22. Compilers Abdulrahman Khoja, Peter Jackson, Teague Stubbington, Sami Abdullah Gargash, Olivia Walter, Peter Wright, Sean McKeown, Gea Olbricht, Hana al Suwaidi, Ghalia al Midfa, Hussien Al-Gunied, Ali Mohammed Albar, Fred Launay, Andrew Spalton, Jaap Wensvoort, Sadek Yehia Al-Osimi, Amarita De Soyza, Alexander Sliwa

23. Reviewers


Arabian Wildcats
(Felis silvestris)
Wildcats Found
Excluded Areas
Cities
N
W
E
S
600 0 500 1000 1500 Kilometers
Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

Genetta felina **Genet**

1.Scientific Name:	*Genetta felina*	Thunberg	1811
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Viverra felina	Thunberg	1811
1B. Family:	Viverridae		
1C. CommonNames:	African Small Spotted Genet	English	
	Genet	English	
	Retam	Arabic	
	Zuraika	Arabic	
1D.Taxonomic level:	Species		

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Mountain, high wadis

2C. Niche: Unknown

2D. Historical distrib:

2E. Current countries: Saudi Arabia, Oman, Yemen

2F. Current regional: Yemen, Oman, Saudi Arabia

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute
Not known

5A. Population Locations are: Not known

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): 21% to 50% over how many years: 15 years
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change: Deforestation

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Decrease in quality

6F. State primary cause of change: Deforestation

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced climate	☑	☑	☑	
Catastrophic				

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐
Notes: Loss of habitat is regarded as a present and future threat and perceived todecrease the population.

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) < 2,500

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☑ (Yes)

If yes, specify rate: >20% Period of decline

Notes:

11. Data quality

11A. Estimates base on:

- ☐ Census or monitoring
- ☐ Indirect information
- ☐ Field study
- ☐ Museum records
- ☑ Informal sightings
- ☑ Literature
- ☐ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
None			

Part Two

13. Status

13A. IUCN Status: Vulnerable Based on: c

13B. Cites: N/K 13C. Natl wildlife Legislation No

13D. Natl Red Data Book: 13E. Intl Red Data Book

13F. Other legislation:

13G. Protected area presence: Raydah

13H. Endorsed protection plan:

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:

☑ Survey studies	☐ Genetic research	☐ Taxonomic research	☑ Life history
	☐ Limiting factor research	☐ Epidemiology	☐ Trade

Othes (taxon specific) KSA- presence/absence, cage/camera trapping, emphasis on western mountains, particularly in the north; Yemen-presence/absence, cage/camera trapping- all over; Oman- presence/absence, cage/camera trapping-Dhofar (southern) emphasis. Habitat use, diet (scats), observation.

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: PHVA not recommended.

15. Management recommendations for the taxon *Specify:*

☑ Habitat management	☐ Wild pop management	☑ Monitoring	☐ Work in local communities
☐ Sustainable utilization	☐ Translocation	☐ Public awareness	☐ Address policy makers ref needs of local people
☐ Ex situ breeding	☐ Genome Resource	☑ Limiting factor	

Notes: Focus on deforestation for causes and possibility of replanting.
KSA protected areas also associated with trapping, ear tags or chips assessment with mark-recapture in key sites.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery	☐ Education	☐ Reintroduction	☐ Benign introduction
☐ Research	☐ Husbandry	☐ Preservation of live genome	

Notes/other

17. Do ex situ stocks already exist ☐ (Yes)

17A. Names of facilities:

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
0	0	0	0	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries No

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries No

18. Level of ex situ management recommended

No

19. Are techniques extablished to propagate the taxon:

No

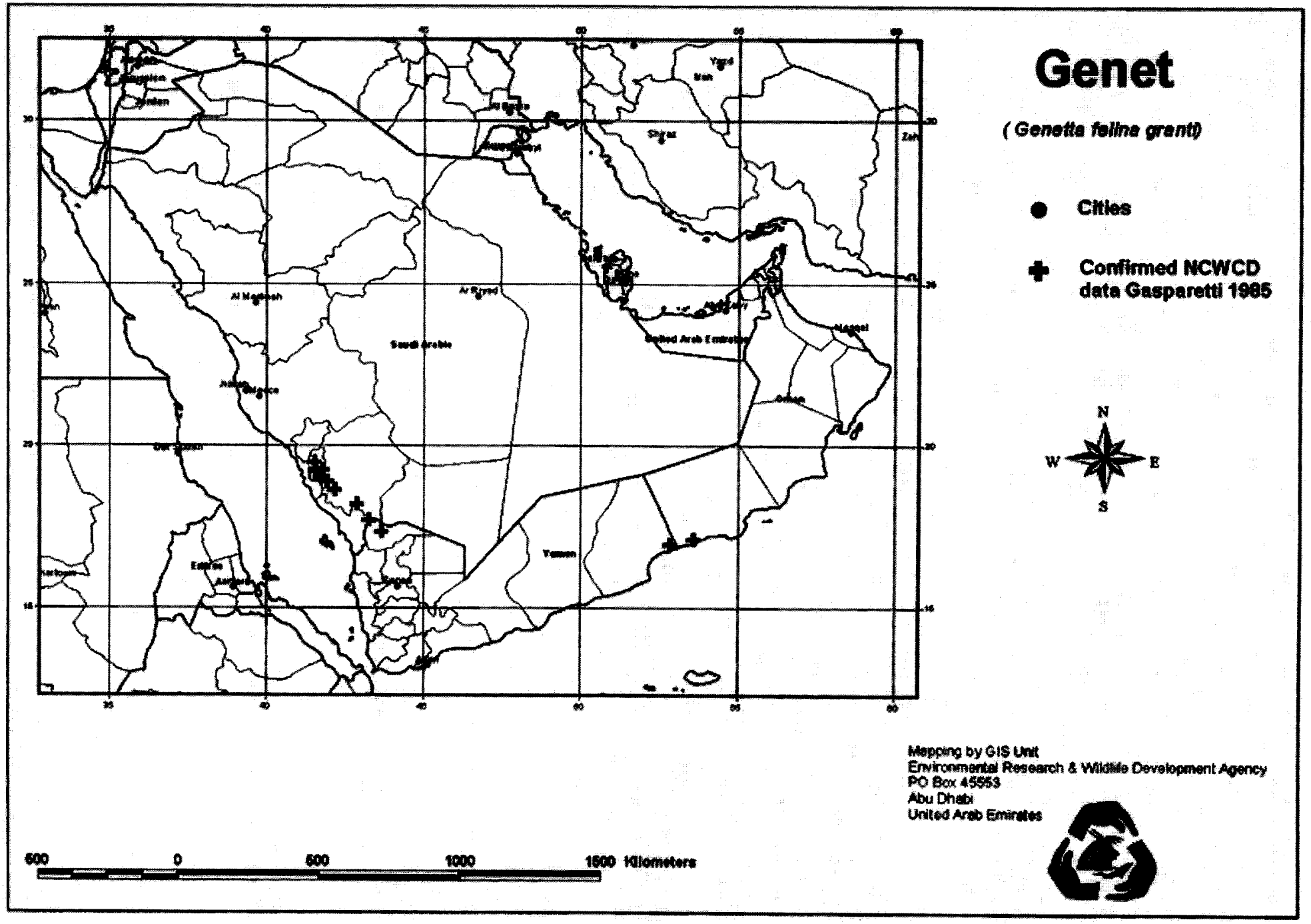
20. Other Comments: None

Part Four

21. Sources: Gasparetti (1985)
Harrison and Bates (1991)
NCWCD records
WAC 2000

22. Compilers Reza Khan, Philip Seddon, Iyad Nader, Patrick Paillat, Mike Smith, Peter Phelan, Chris Drew, Peter McKinney, Gary Feulner, Robert Llewellyn_Smith

23. Reviewers


Genet
(Genetta felina grant)
Cities
Confirmed NCWCD data Gasparetti 1985
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Saudi Arabia
Yemen
600 0 600 1000 1500 Kilometers
Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Hemitragus jayakari*	Thomas	1894
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date

1B. Family: Bovidae

1C. CommonNames:	Al Thar Al 'Arabi	Arabic
	Al Wa'al Al Al'Arabi	Arabic
	Arabian Tahr	English

1D.Taxonomic level: Species

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Arid Mountains

2C. Niche: Sea level to 3,000m

2D. Historical distrib: Sultanate of Oman and United Arab Emirates

2E. Current countries: Sultanate of Oman and United Arab Emirates

2F. Current regional: Sultanate of Oman and United Arab Emirates

2G Migration regions: Possible migration but no data

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: 5,001 - 20,000 sq km

Notes (Occurrence) Insall (1999 p. 132) gives 19,000 sq Km of "primary" and "secondary" habitat.

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy) Best data suggest area of occupancy of 13,400 sq Km comprising 134 10x10 Km squares (Insall 1999 p. 136)

5. No. of Locations or Subpopulations in which the taxon is distribute

In Northern Oman there are 3 main locations and 17 areas where tahr are present. In UAE Jebel Hafit (common to Oman) and Wadi Wurrayah.

5A. Population Locations are: Fragmented

Notes: Habitat increasing in Northern Oman but decreasing in Musandam.

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑

If yes, describe: Increase in Area

6B. If decreasing, what has been the decrease in Habitat area

approximate change (%): < 20% over how many years: 10

Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat

approximate change (%): No over how many years: 10

6D. State primary cause of change: Changes in pressure of livestock grazing.

6E. Is there any change in the quality of the habitat where the taxon occurs ☑

If yes, Describe: Increase in quality

6F. State primary cause of change: Reduction in grazing pressure due to changes in grazing patterns as a result of increased affluence, except in Musandam

Notes:

7. Threats

Human interference	Present	Future	Lead to decline	Notes on future threat

Natural/man induced	Present	Future	Decline	Notes on future threat
disease	☑	☑	☑	
genetic problems	☐	☐	☐	
interspecific competition	☐	☑	☐	Food and Water. From exotics such as hyrax (Procavia capensis)
interspecific competition lives	☑	☑	☐	
nutritional disorders	☐	☐	☐	

Catastrophic	Present	Future	Decline	Notes on future threat
drought	☑	☑	☑	Disease is considered to be another catastrophe which could have a significant impact on populations.

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Grazing, Harvest/Hunting, Harvest for food are present threats which may result in a decline in the species. Habitat fragmentation is a future threat which may result in a decline in the species.

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☑ Local ☐ Commercial ☐ Domestic ☑ International

8B. Parts in Trade: Live animal
Meat

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

Small cross border trade between Oman and UAE. Suspected of having a local affect on population.

9. Population number

9A. Global Population 6,400 estimate

9B. Regional Population As above

9C. Number of Mature Individuals (all populations) < 10,000

9D. Generation time 4/5 years based on captive observations.

10. Population trends

10A. Trends in Pop size: Increasing

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes: Estimate based on an area of occupancy of 13,400 sq Km. Insall (1999) argues that 24% is primary habitat which will give 3,216 sq Km of primary habitat. Munton (1978) argued that a likely density in primary habitat would be 2 animals per sq Km. This should give a projected population in Oman in 1998 of approximately 6,400 animals. To test this value, the suggested population of 2000 (Munton 1978) was increasd by 6% per year to 1998. This also suggested an estimated population size around 6,400 animals.

11. Data quality

11A. Estimates base on:

- ☑ Census or monitoring
- ☑ Indirect information
- ☑ Field study
- ☑ Museum records
- ☑ Informal sightings
- ☑ Literature
- ☑ Hearsay/belief

Notes: Extrapolations from captive herd, anecdotal information, personal observations of the CAMP specialists.

12. Recent Field Studies

Researcher names	Location	Dates	Topics
Chris and Tilde Stuart, Wadi Wurrayah- 1995- General research			
David Insall, Oman- 1994 to 1999- Tahr ecology.			

Part Two

13. Status

13A. IUCN Status: Vulnerable Based on: B1 B3c

13B. Cites: Unlisted

13C. Natl wildlife Legislation Sultanate of Oman- Protected against hunting and capture.

13D. Natl Red Data Book: Oman- Endangered

13E. Intl Red Data Book Endangered

13F. Other legislation:

13G. Protected area presence: Thriving population in Wadi Sarin Wildlife Reserve, Sultanate of Oman.

13H. Endorsed protection plan: No

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:
☐ Genetic research ☐ Taxonomic research ☑ Life history
☑ Survey studies ☑ Limiting factor research ☑ Epidemiology ☑ Trade

Othes (taxon specific) Study on the migration of tahr recommended.

14A. Is Population and Habitat Viability Assessment recommended ☑(Yes)

Notes: In Press

15. Management recommendations for the taxon *Specify:*

☑ Habitat management ☑ Wild pop management ☑ Monitoring ☑ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☑ Genome Resource ☑ Limiting factor

Notes: Genome resource banking is a long term project. Under limiting factor management, there is a need for optimal accessibility by tahr to water that is not available to man or his livestock.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☐ Reintroduction ☐ Benign introduction
☑ Research ☑ Husbandry ☑ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Omani Mammal Breeding Centre, private collection in Abu Dhabi, private collection on Sir Beni Yas, Abu Dhabi and others unknown.

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
12	8	4	24	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☑(Yes)

If yes, specify countries Sultanate of Oman and the United Arab Emirates

18. Level of ex situ management recommended

Initiate ex situ program within 3 years

19. Are techniques extablished to propagate the taxon:

Some techniques known for taxon or similar taxon

20. Other Comments: Lack of basic indebth nformation is clear. Strong need for further research. There is little well supported data on any aspect of the biology of this species. To ensure conservation action is successful, information is needed on the size of natural areas needed to support the social unit, (believed to be one male, one female and kid); on all aspects of migration of tahr including verification; on epidemiology of diseases acquired from domestic livestock; verification of trends in rangeland improvement and deterioration in various areas; work on provision of waterholes easily available to tahr but not to man or his livestock.

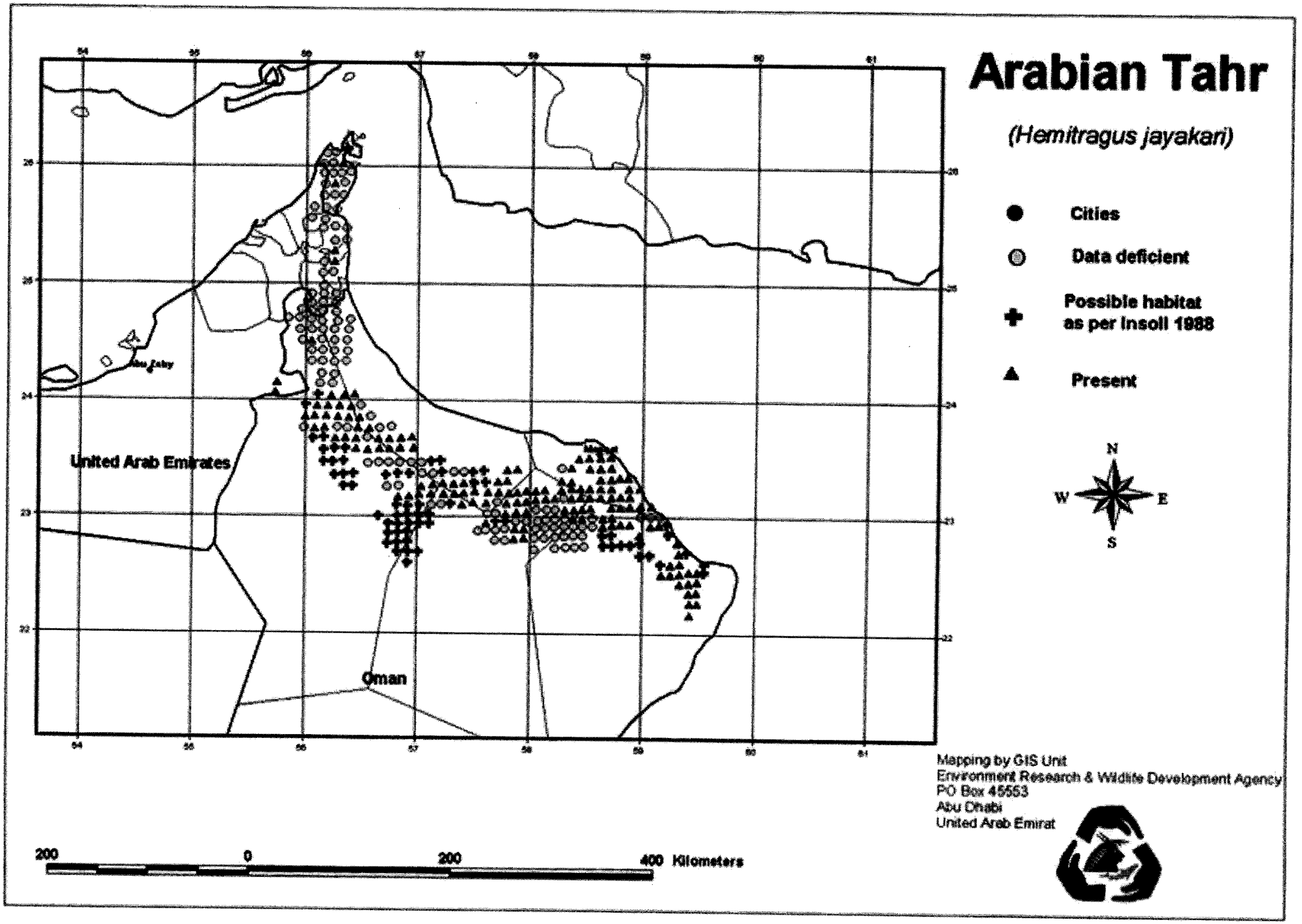
Part Four

21. Sources:

Insall, David, 1999. A Review of the Ecology and Conservation Status of the Arabian Tahr in M. Fisher, S. A. Ghazanfar and A. Spalton (Eds) The Natural History of Oman. A Festschrift For Michael Gallagher, pp 129- 146. Backhuys Publisher.
Munton, Paul, 1985. The Ecology of the Arabian Tahr. Journal of Oman Studies, Vol 8 (Pt 1) pp.11- 48
Munton, Paul, 1988. Comparison of Tahr & Gazelle Populations. In Conservation & Biology of Desert Antelopes, Dixon, A. and David Jones, Eds, Zoological Society of London, Christopher Helm, London pp. 182-192.

22. Compilers Richard J Wood, Saud M Anajariyya, Mubarak Ali Al Dosari, Ronald A Loughland, Dieter Ernst, Ayoub Rajab Al-Bulushi, Abdulqader Awadh Alawi Ibrahim, Salim Abdullah Bahwan, Paul Munton, Kevin Budd, Declan O'Donovan, Andrew

23. Reviewers


Arabian Tahr
(Hemitragus jayakari)
Cities
Data deficient
Possible habitat as per Insoll 1988
Present
N
W
E
S
United Arab Emirates
Oman
200 0 200 400 Kilometers
Mapping by GIS Unit
Environment Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirat

Conservation Assessment Management Plan
Taxon Data Sheet

Arabian Carnivore CAMP

Wednesday, February 09, 2000

Herpestes edwardsi ferrugineus — **Indian Grey Mongoose**

1.Scientific Name:	*Herpestes edwardsi ferrugineus*	Blanford	1874
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Herpestes ferrugineus		
1B. Family:	Herpestidae		
1C. CommonNames:	Aksh	Arabic	
	Indian Grey Mongoose	English	
	Nims	Arabic	
	Shafs	Arabic	
1D.Taxonomic level:	Subspecies		

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Associated with human habitation. Animal is anthropophilic. Water must be present.

2C. Niche: Associated with human habitation less than 1000 meters. Mainly near the coast but found up to 40 Kms away.

2D. Historical distrib: Possibly introduced in the last 30 years along the Gulf coast of the Arabian peninsula. Thought not to have been present 100 years ago.

2E. Current countries: Kuwait, Bahrain, Qatar, United Arab Emirates, Saudi Arabia

2F. Current regional: Gulf coast of the Arabian peninsula.

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence) Coastal strip and increasing.

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute
Unknown

5A. Population Locations are: Fragmented

Notes: Associated with human habitation and cultivation. Populations are spreading.

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Increase in Area

6B. If decreasing, what has been the decrease in Habitat area

approximate change (%): over how many years:

Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat

approximate change (%): over how many years:

6D. State primary cause of change: Human settlement.

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Increase in quality

6F. State primary cause of change: Human settlement

Notes:

7. Threats

	Present	Future	Trend to decline	Notes on future threat
Human interference				
Natural/man induced	Present	Future	Decline	Notes on future threat
Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Pesticides, poisoning and road kills are all regarded as present and future threats which are not likely to lead to decreases.

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☑ Local ☐ Commercial ☐ Domestic ☑ International

8B. Parts in Trade: Live animal

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline
None

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) < 2,500

9D. Generation time 2 years

10. Population trends

10A. Trends in Pop size: Increasing

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes:

11. Data quality

11A. Estimates base on:

- ☐ Census or monitoring
- ☑ Indirect information
- ☐ Field study
- ☑ Museum records
- ☑ Informal sightings
- ☑ Literature
- ☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics

Part Two

13. Status

13A. IUCN Status: Lower risk - least concern Based on:

13B. Cites: 13C. Natl wildlife Legislation

13D. Natl Red Data Book: 13E. Intl Red Data Book

13F. Other legislation:

13G. Protected area presence: None

13H. Endorsed protection plan: None

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:

☑ Genetic research ☐ Taxonomic research ☑ Life history
☑ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: PHVA is not recommended.

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☑ Wild pop management ☑ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☐ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes:

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☐ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Breeding Centre for Endangered Arabian Wildlife, Sharjah

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
4	3	0	7	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

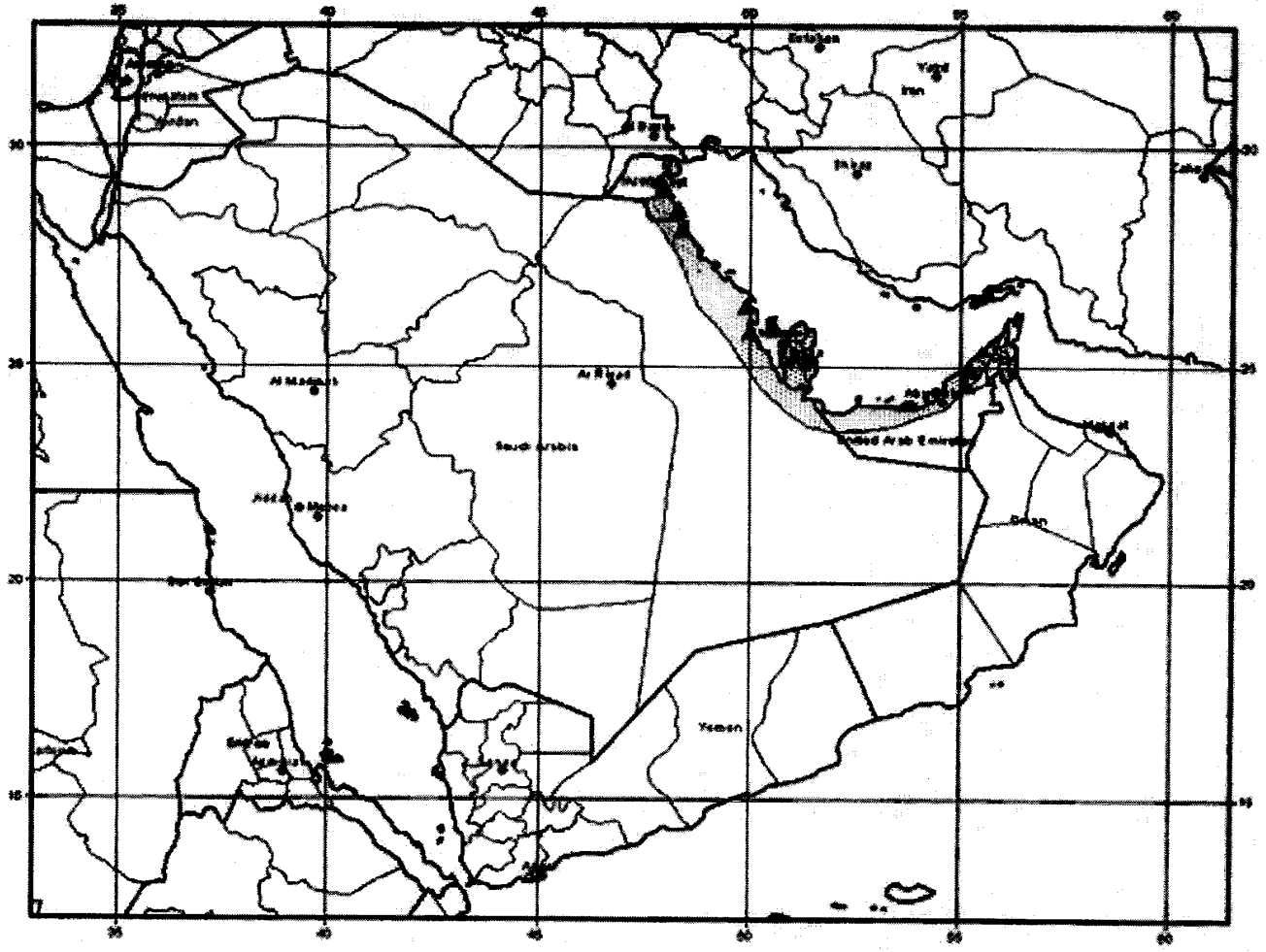
20. Other Comments:

Part Four

21. Sources: Harrison, D.L. and Bates, P.J.J. (1991): Mammals of Arabia, 2nd Edition. Harrison Zoological Museum, Sevenoaks, U.K.
Roberts, T.J. (1997): The Mammals of Pakistan, Oxford University Press. Pages 191-193

22. Compilers Gea Olbricht, Hana al Suwaidi, Sean McKeown, Ghalia al Midfa, Hussein Al-Gunied, Ali Mohammed Albar, Peter Wright, Fred Launay, Andrew Spalton, Jaap Wensvoort, Sami Abdullah Gargash, Peter Jackson, Abdulrahman Khoja, Sadek Yehia Al-Osimi, Teague Stubbington, Olivia Walter, Alexander Sliwa, Amrita De Soyza

23. Reviewers



Indian Grey Mongoose

(Herpestes edwardsi)

▲ Sightings of Indian Grey Mongoose

● Cities

▭ Possible Distribution

N
W E
S

600 0 600 1000 1600 Kilometers

Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Hyaena hyaena*	Linnaeus	1758
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Canis hyaena	Linnaeus	1758
1B. Family:	Hyaenidae		
1C. CommonNames:	Dhuba	Arabic	
	Mukhatat	Arabic	
	Striped hyena	English	
1D.Taxonomic level:	Species		

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Desert, gravel, rocky hill country

2C. Niche:

2D. Historical distrib: Throughout the peninsula except the Rub al Khali

2E. Current countries: Oman, Yemen, Saudi Arabia, United Arab Emirates (unconfirmed)

2F. Current regional:

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute

5A. Population Locations are: Not known
Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): 21% to 50% over how many years: 20 years
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change: Development and Agriculture

6E. Is there any change in the quality of the habitat where the taxon occurs ☐
If yes, Describe:

6F. State primary cause of change: Development and Agriculture

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced	Present	Future	Decline	Notes on future threat
Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Harvest/Hunting, Pesticides, Poisoning, Road Kills and Trade for market or medicine are all regarded as present and future threats likely to result in reduced population. Harvest for medicine is a present threat perceived to reduce the population.

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☑ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade: Hair
Live animal
Meat
Organs

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline
Medicine trade is perceived to have greatest effect on population.

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) < 2,500

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Declining

10B. Rate of decline:. <20% Period of decline 20 years

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☐ Field study ☐ Museum records ☑ Informal sightings ☐ Literature ☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics

Part Two

13. Status

13A. IUCN Status: Vulnerable Based on: C1

13B. Cites: Not listed 13C. Natl wildlife Legislation None

13D. Natl Red Data Book: None 13E. Intl Red Data Book Unknown

13F. Other legislation:

13G. Protected area presence: KSA-Al-Kunfah, Harrat Al Harrah, At-Tubayq, Raydah; Oman- White Oryx Sanctuary

13H. Endorsed protection plan: No

Notes: Less than 10,000. Estimated decline greater than 10% in 10 years.

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:
☑ Genetic research ☑ Taxonomic research ☑ Life history
☑ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: No PHVA recommended.

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☑ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes: Maintain current collections for public awareness. KSA- NCWCD poster campaign. Monitor- persistence for KSA protected areas and impact on livestock.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other KSA- presence/absence, camera trapping, spot lighting, particularly in north-west and central

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Riyadh Zoo, Arabia's Wildlife Centre, Sharjah, Dubai Zoo

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
2	1	0	3	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries No

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries No

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Some techniques known for taxon or similar taxon

20. Other Comments:

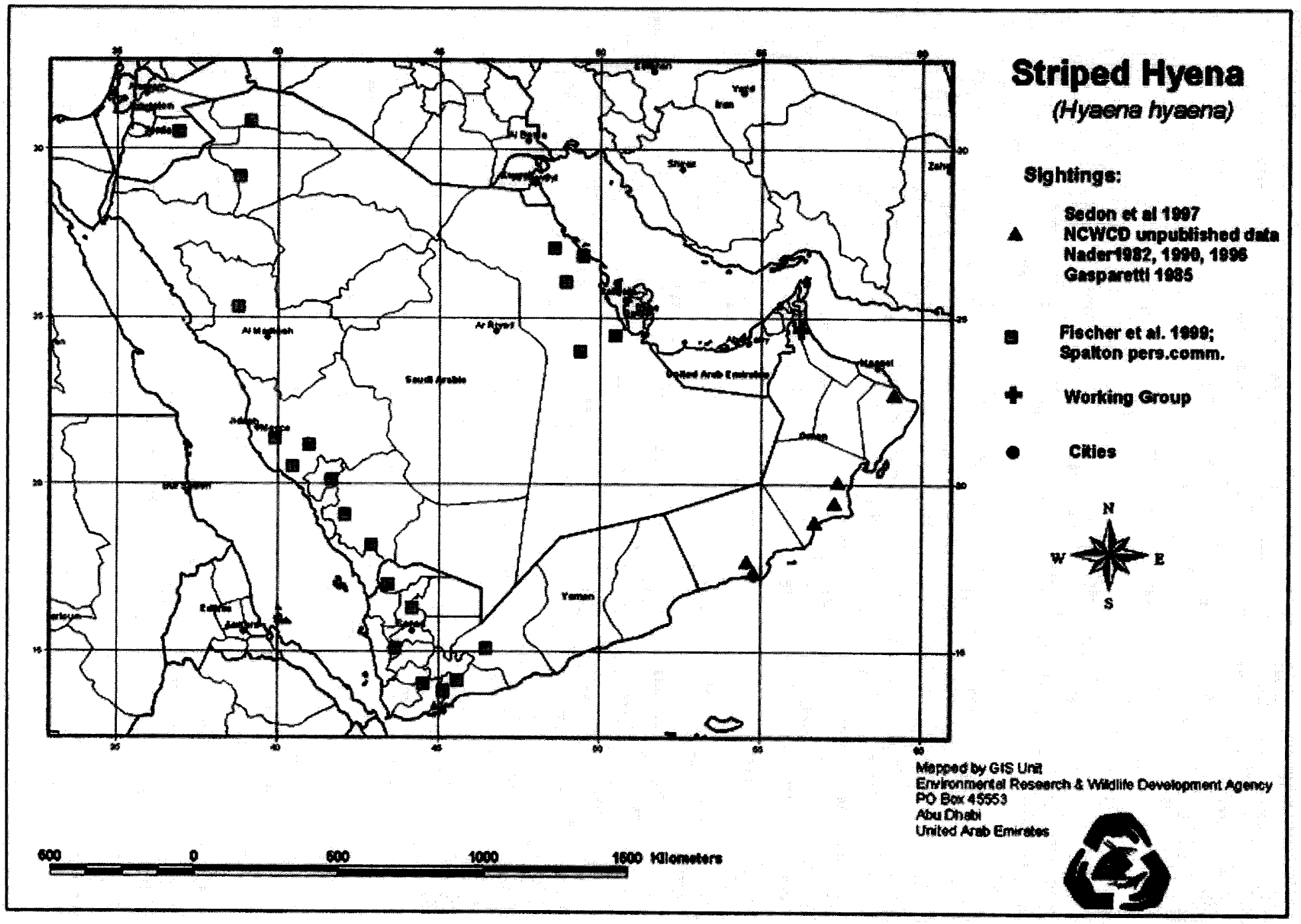
Part Four

21. Sources:

Harrison and Bates (1991)
Gesperetti (1985)
Nader (1990)
Mills and Hoffer (1998)
Nader (1982)
Fisher (1999)

22. Compilers Mike Smith, Reza Khan, Iyad Nader, Peter Phelan, Gary Feulner, Patrick Paillet, Chris Drew, Philip Seddon, Peter McKinney, Robert Llewellyn-Smith

23. Reviewers


Striped Hyena
(Hyaena hyaena)
Sightings:
Sedon et al 1997
NCWCD unpublished data
Nader1982, 1990, 1996
Gasparetti 1985
Fischer et al. 1999;
Spalton pers.comm.
Working Group
Cities
N
W
E
S
Yemen
Mapped by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates
600 0 600 1000 1600 Kilometers

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Ichneumia albicauda albicauda*	Cuvier	1829
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Herpestes albicauda	Cuvier	1829
1B. Family:	Herpestidae		
1C. CommonNames:	Aksh	Arabic	
	Nims abiadhal-thail	Arabic	
	White Tailed Mongoose	English	
1D.Taxonomic level:	Subspecies		

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Associated with permanent water and thick cover. Wadis.

2C. Niche: Associated with permanent water and thick cover at elevations less than 1000 meters.

2D. Historical distrib: On Arabian peninsula: Oman, Saudi Arabia, Yemen, United Arab Emirates

2E. Current countries: On Arabian peninsula: Oman, Saudi Arabia, Yemen, United Arab Emirates

2F. Current regional: On Arabian Peninsula: Oman, Saudi Arabia, Yemen, United Arab Emirates

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy) Likely to be much larger than this estimate

5. No. of Locations or Subpopulations in which the taxon is distribute
Unknown

5A. Population Locations are: Fragmented

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Unknown

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): over how many years:
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): < 20% over how many years: 10

6D. State primary cause of change: Fossil water extraction

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Decrease in quality

6F. State primary cause of change: Fossil water extraction

Notes:

7. Threats

Human interference	Present	Future	Lead to decline	Notes on future threat
Natural/man induced	Present	Future	Decline	Notes on future threat
decline in prey species	☑	☑	☑	
interspecific competition	☐	☑	☑	by exotics, specifically H. edwardsii, an introduced species.
Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐
Notes: Loss of habitat and poisoning are both present and future threats which may result in decline.

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) > 10,000

9D. Generation time 3 years

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☑ (Yes)

If yes, specify rate: <20% Period of decline 10 years

Notes:

11. Data quality

11A. Estimates base on:

- ☑ Census or monitoring
- ☐ Indirect information
- ☐ Field study
- ☑ Museum records
- ☑ Informal sightings
- ☑ Literature
- ☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
Breeding Centre for Endangered Arabian Wildlife, Sharjah		1996-2000	

Part Two

13. Status

13A. IUCN Status: Lower risk - near threatened? Based on: Code?

13B. Cites: Not listed

13C. Natl wildlife Legislation Oman- Ministerial decision 207/93, Royal decree 111/96

13D. Natl Red Data Book:Oman-DD

13E. Intl Red Data Book

13F. Other legislation:

13G. Protected area presence: Raydah Asir Reserve, Kingdom of Saudi Arabia, Jebel Samhan Nature Reserve

13H. Endorsed protection plan:

Notes: Based on population estimates.

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:

☑ Survey studies ☐ Genetic research ☐ Limiting factor research ☐ Taxonomic research ☐ Epidemiology ☑ Life history ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: PHVA not recommended.

15. Management recommendations for the taxon *Specify:*

☑ Habitat management ☐ Wild pop management ☑ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☐ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes: Address policy makers ref needs of local people.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☐ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Breeding Centre for Endangered Arabian Wildlife, Sharjah; Dubai Zoo; Riyadh Zoo

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
0	0	0	0	☑

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries

18. Level of ex situ management recommended

Ongoing ex situ program intensified or increased

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments: Extraction of fossil water is lowering the permanent water table and thus altering vegetation and mongoose habitat. All possible current habitat needs to be surveyed on a regular basis to quantify population changes.

Water management plan for region needs to be established on country basis to reduce this serious impact.

Part Four

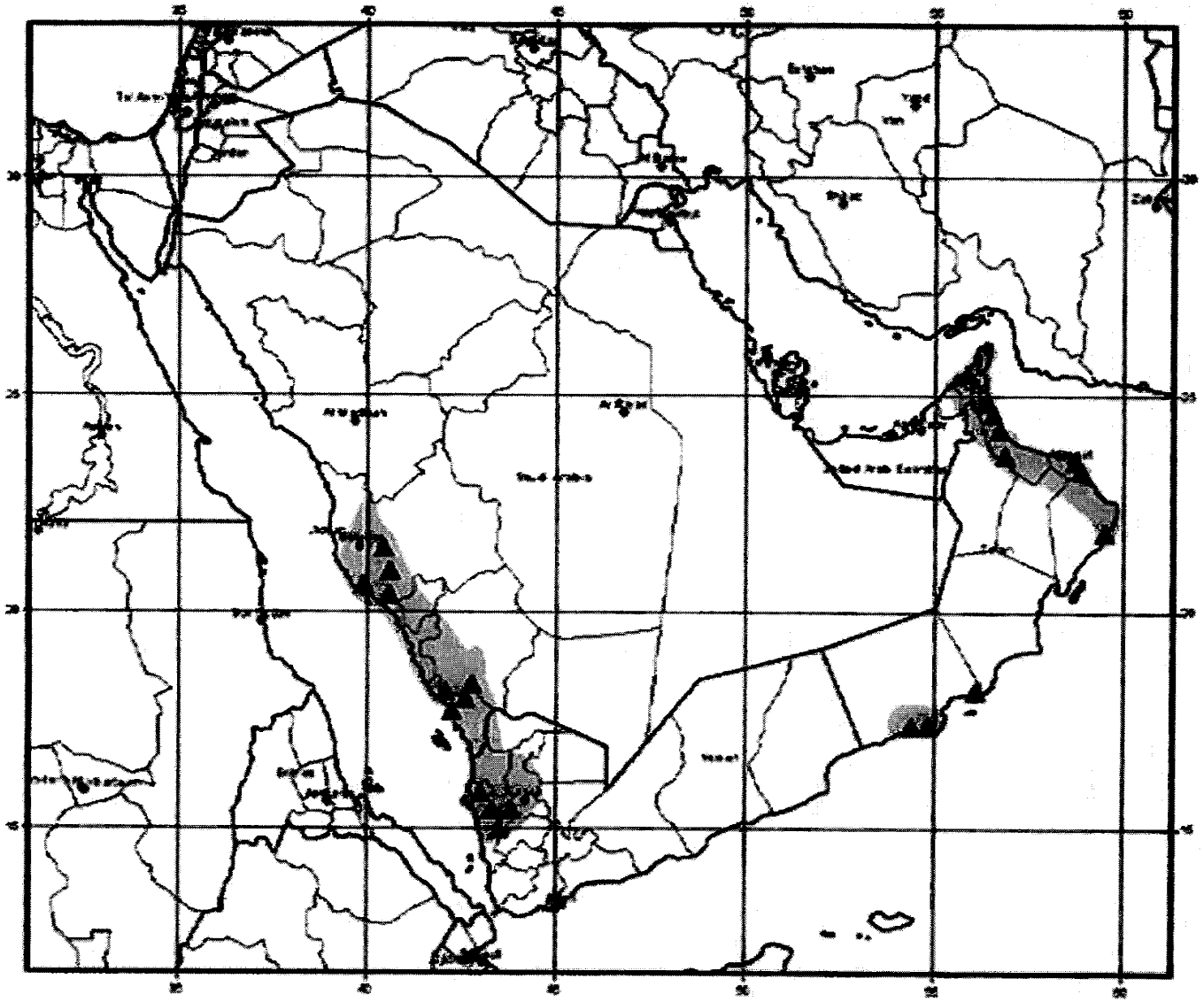
21. Sources: Kingdon, J. (1991): Arabian Mammals: A Natural History. Academic Press, London, U.K. Pages 93-94 and 223
Harrison, D.L. and Bates, P.J.J. (1991): The Mammals of Arabia, 2nd Edition. Harrison Zoological Museum, Sevenoaks, U.K.

22. Compilers Peter Jackson, Sean McKeown, Gea Olbricht, Hana al Suwaidi, Ghalia al Midfa, Hussien Al-Gunied, Ali Mohammed Albar, Peter Wright, Fred Launay, Andrew Spalton, Jaap Wenvoort, Sami Abdullah Gargash, Abdulrahman Khoja, Sadek Yehia Al-Osimi, Teague Stubbington, Olivia Walter, Alexander Sliwa, Amrita De Soyza

23. Reviewers

White Tailed Mongoose

(Ichneumia albicauda)



▲ Sightings

● Cities

Extent of Occurance

N
W E
S

600 0 600 1000 1600 2000 Kilometers

Mapping by GIS Unit
Environment Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

Mellivora capensis **Ratel**

1.Scientific Name:	*Mellivora capensis*	Schreber	1776
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Viverra capensis	Schreber	1776
1B. Family:	Mustelidae		
1C. CommonNames:	Akel al-Assal	Arabic	
	Drombel	Arabic (local)	
	Honey Badger	English	
	Ratel	English/French	
1D.Taxonomic level:	Species		

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Gravel desert, steppe, sand desert

2C. Niche:

2D. Historical distrib: Throughout Saudi Arabian peninsula

2E. Current countries: United Arab Emirates, Saudi Arabia, Yemen, Oman (post 1980 sightings)

2F. Current regional:

2G Migration regions: Unk.

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence) Data deficient

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute
Unknown

5A. Population Locations are: Not known

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): Unknown over how many years:
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): Unknown over how many years:

6D. State primary cause of change: Habitat alteration through development

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Decrease in quality

6F. State primary cause of change: Habitat alteration

Notes:

7. Threats

	Present	Future	Decline	Notes on future threat
Human interference				
Natural/man induced disease	☑	☐	☑	Rabies (possible)
Catastrophic				

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Grazing, Loss of habitat, Habitat fragmentation- all are present and future threats, probably will result in decline

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) Unknown

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Unknown Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Unknown Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☐ Field study ☐ Museum records ☑ Informal sightings ☐ Literature ☐ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
None			

Part Two

13. Status

13A. IUCN Status: Not listed Based on:

13B. Cites: III

13C. Natl wildlife Legislation Saudi Arabia- no, UAE- FEA law? & 1976 Hunting law

13D. Natl Red Data Book: Saudi Arabia- no, UAE- no

13E. Intl Red Data Book Not listed

13F. Other legislation:

13G. Protected area presence: Saudi Arabia- Harrat al Harrah, Mahzat As-Sayd. Raydah; Oman- White Oryx Sanctuary

13H. Endorsed protection plan: None

Notes: Data deficient, cannot estimate population size or trends.

Part Three

14. Supporting Research

Is research recommended for taxon? ☑ (Yes)

Specify:

☑ Survey studies	☐ Genetic research	☐ Taxonomic research	☑ Life history
	☐ Limiting factor research	☐ Epidemiology	☐ Trade

Othes (taxon specific) KSA- presence/ absence to assess distribution, particularly in western and central regions based on footprints (need careful identification). Oman/ Yemen- assess range.. UAE- follow up on reports to see if they exist. Habitat type based on surveys. 20 key populations.

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes:

15. Management recommendations for the taxon

Specify:

☐ Habitat management	☐ Wild pop management	☑ Monitoring	☐ Work in local communities
☐ Sustainable utilization	☐ Translocation	☑ Public awareness	☐ Address policy makers ref needs of local people
☐ Ex situ breeding	☐ Genome Resource	☐ Limiting factor	

Notes: Trapping and use of chips and tags to assess persistence and age/sex of key populations. For example Maharat as-Sayd (KSA) with possibility of radiotracking and chips.
Public awareness- include in general programs such as NCWD carnivore posters revision.

16. Ex situ management recommendations

If Ex situ breeding recommended in Q15, is it for:

☐ Species recovery	☐ Education	☐ Reintroduction	☐ Benign introduction
☐ Research	☐ Husbandry	☐ Preservation of live genome	

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Riyadh Zoo

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
1	3	5	9	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Some techniques known for taxon or similar taxon

20. Other Comments:

Part Four

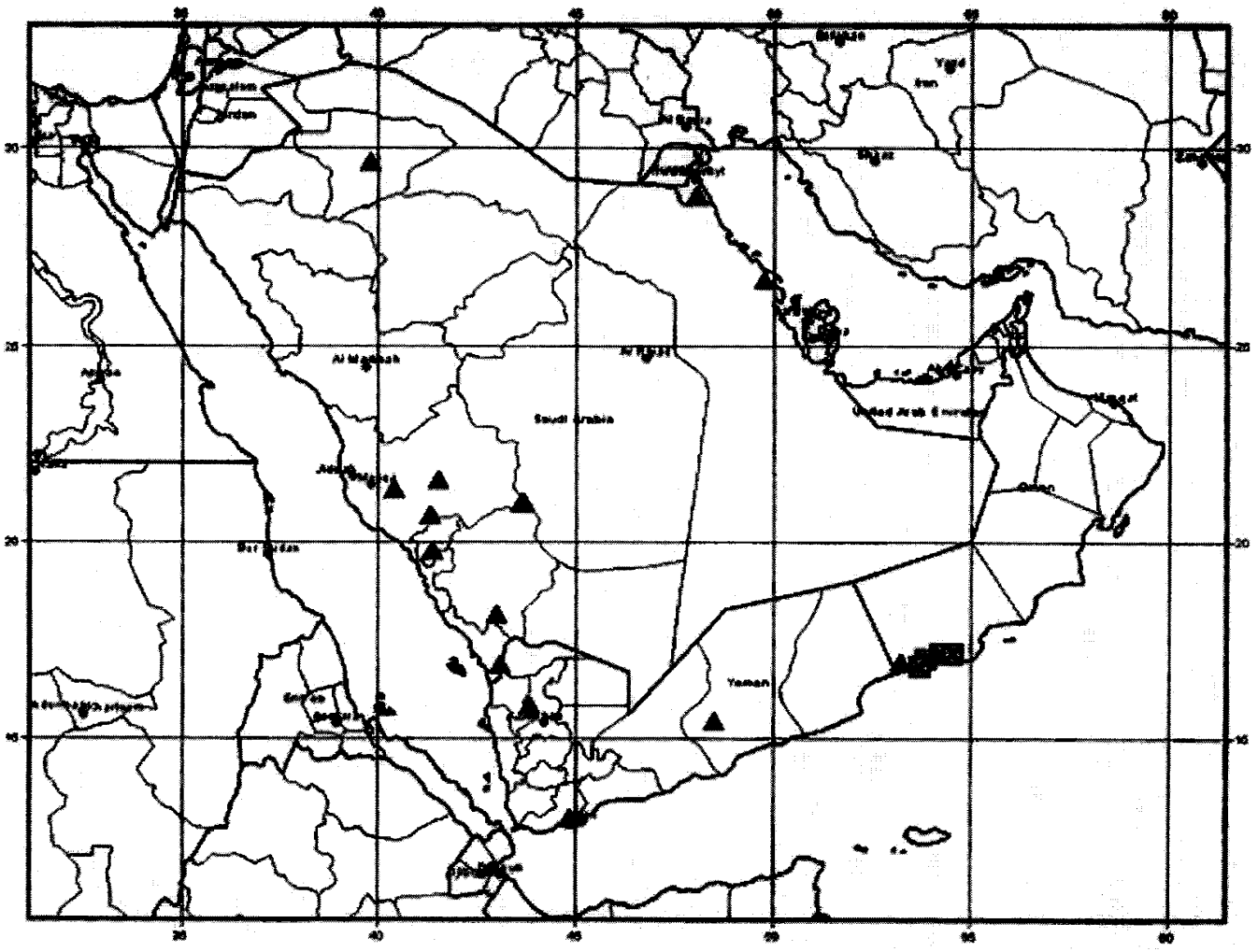
21. Sources:

Kingdon, J.(1991): Arabian Mammals: A Natural History. Academic Press, London, U.K. pages 88-89 and 217.
Roberts, T.J. (1997): The Mammals of Pakistan, Oxford University Press, pages 173-176.
Nowak, R.M. (1999): Walker's Mammals of the World, 6th Edition. The Johns Hopkins University Press, pages 727-728.
Internet references- http://www.gisbau.uniroma1.it/amd/amd010.html
http://www.badgers.org.uk/brockwatch/2melliv1.html

22. Compilers

Iyad Nader, Reza Khan, Peter McKinney, Gary Feulner, Patrick Paillat, Philip Seddon, Peter Phelan, Robert Llewellyn-Smith, Mike Smith, Chris Drew

23. Reviewers



Ratel

(Mellivora capensis)

Ratel Sightings :

- ▲ NCWCD data; Gasparetti, 1985; Seddon, et al. 1997
- ■ Richard Woods pers comm.
- ● Cities

N
W E
S

500 0 500 1000 1500 Kilometers

Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

Arabian Carnivore CAMP

Wednesday, February 09, 2000

Panthera pardus nimr **Arabian Leopard**

1.Scientific Name:	*Panthera pardus nimr*	Hemprich and Ehrenberg	1833
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Type locality fixed by Felis nimr	Harrison	1968
1B. Family:	Felidae		
1C. CommonNames:	Arabian Leopard	English	
	Nimr	Arabic	
	Nimr arabi	Arabic	
1D.Taxonomic level:	Subspecies		

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Gravel plains, Mountain areas, Avoids areas of human habitation. Permanent water is necessary. Juniper forest.

2C. Niche: 200- 3000 meters, a generalist which does not compete well with man.

2D. Historical distrib: Oman, Saudi Arabia, United Arab Emirates, Yemen

2E. Current countries: Oman, Saudi Arabia, United Arab Emirates, Yemen

2F. Current regional: Very small numbers in Northern mountain ranges, more common in Southern Oman through to Saudi Arabia (Asir and Hejaz Mountains)

2G Migration regions: The Shimaliya range of mountains is thought to be the corridor linking populations in the Musandam and Hajar Mountains. There is no evidence of resident leopards in this corridor. Possible interchange between Hajar and Asir populations in Saudi Arabia. An alternative view is that there are resident leopards in this region.

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute
3- 4 subpopulations

5A. Population Locations are: Fragmented
Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): < 20% over how many years: 50 years
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change: Persecution and loss of natural prey base

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Decrease in quality

6F. State primary cause of change: Human interference.

Notes:

7. Threats

Human interference	Present	Future	Increase to decline	Notes on future threat

Natural/man induced	Present	Future	Decline	Notes on future threat
decline in prey species	☑	☑	☑	
genetic problems	☑	☑	☑	

Catastrophic	Present	Future	Decline	Notes on future threat
drought	☑	☑	☑	

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Hunting, Trade for market or medicine, Poisoning, Loss of habitat, Grazing (loss of coastal forest) and Habitat fragmentation are all present and future threats which may result in a decline in the species.

Prioritized threat list. #1 is the greatest threat.
1- Hunting
2-Trade for Market or Medicine
3- Decline in prey species
4- Poisoning
5- Loss of Habitat
6- Grazing
7- Habitat fragmentation
8- Genetic problems
9- Drought

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☑ International

8B. Parts in Trade: Fat
Live animal
Products
Skin
Skin segments
Skulls
Teeth

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline
International in the sense that it crosses country borders but limited to this region of countries.

Live animal trade is perceived to have the greatest effect on population numbers.

9. Population number

9A. Global Population 50- 200

9B. Regional Population 3- 4 subpopulations

9C. Number of Mature Individuals (all populations) < 250

9D. Generation time 4- 5 years

10. Population trends

10A. Trends in Pop size: Declining

10B. Rate of decline:. >80% Period of decline 50 years

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes: 60% decline in KSA. >80% decline in Northern Oman. >80% decline in UAE

11. Data quality

11A. Estimates base on:

☑ Census or monitoring	☐ Field study	☑ Informal sightings
☑ Indirect information	☑ Museum records	☑ Literature
		☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics

Field studies in the briefing book and sources list at the end of this document
Undocumented field work by Andrew Spalton in Oman
Limited field work by Stuarts and Budd in United Arab Emirates and Kingdom of Saudi Arabia
Nader and Paillat- Saudi Arabia- 1999
Spalton and Willis- Oman- 1999
Llewellyn-Smith, R.- United Arab Emirates- Current- Scats and footprints

Part Two

13. Status

13A. IUCN Status: Critically endangered Based on: C1

13B. Cites: I

13C. Natl wildlife Legislation Oman- Ministerial Decision 207/93, Royal Decree 111/96, 7598

13D. Natl Red Data Book: Oman CR- B1 & 2A, C2A, D

13E. Intl Red Data Book Extinct

13F. Other legislation: In Oman the penalty is 5 years and/or 5000 rials.

13G. Protected area presence: Oman- Jebel Samhan

13H. Endorsed protection plan:

Notes: Less than 250 mature individuals

Part Three

14. Supporting Research Is research recommended for taxon? ☐ (Yes)

Specify:

☑ Genetic research ☑ Taxonomic research ☑ Life history
☑ Survey studies ☑ Limiting factor research ☑ Epidemiology ☑ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☑(Yes)

Notes: Pending

15. Management recommendations for the taxon *Specify:*

☑ Habitat management ☑ Wild pop management ☑ Monitoring ☑ Work in local communities
☐ Sustainable utilization ☑ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☑ Genome Resource ☑ Limiting factor

Notes: Highest priority is Limiting factor management, in this case identified as hunting. Also address policy makers ref needs of local people.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☑ Species recovery ☑ Education ☑ Reintroduction ☐ Benign introduction
☑ Research ☑ Husbandry ☑ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: See studbook

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
8	8	2	18	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☑(Yes)

If yes, specify countries All range countries.

18. Level of ex situ management recommended

Ongoing ex situ program intensified or increased

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments: The Arabian leopard will be difficult to save and manage even if it is only one subspecies. If two are recognised on the peninsula then at least one will be likely to become extinct. The leopard Nimr at the Breeding Centre for Endangered Arabian Wildlife, Sharjah has poor records since capture and before transfer to Sharjah. Some people are doubtful whether or not it is a true Arabian leopard or brought into captivity from outside the region. Some people in the group do not want this leopard recognised in the studbook. The sub-species debate is still unresolved and there is ongoing genetic research in Saudi Arabia as well as by Steve O'Brien which might provide some answers.
Would have occurred in savannah areas before it was displaced by human

activities. There are 3 to 4 subpopulations listed but are they truly seperated or limited in terms of genetic transfer? Has the prey size determined the size of the leopard? Need to establish the natural prey base for this animal to enable better habitat management. Porcupine noted to be eaten by leopard in Palestine, Baluchistan and India, not preferred prey in Africa. Is this a marginal prey species which is targeted due to decline in prerferred species? Without direct persecution this animal could survive around human settlement. The fat from the leopard is used in traditional medicine in the Kingdom of Saudi Arabia. There is a report of a $5000 reward offered in UAE for capture of live leopard (illegally of course).
Whilst everybody recognized that genetic problems were a definite threat, it was not a primary threat to the population except in an indirect manner as each of the other perceived threats would have a greater impact on the survival of the sub-species, i.e. would be intensified because of a reduced genetic pool.
The number of mature animals was calculated on the basis that it is thought that as soon as they are sexually mature they become reproductively active because there is more available habitat than there is leopards and thus due to reduced competition they could breed earlier.
There is no legislation officially protecting the leopard in Arabia except in Oman. This needs to be addressed urgently and the legislation once passed must be strictly enforced.
There needs to be a captive breeding cooperation programme with all centres holding these animal. A regional breeding recommendation approved by a steering committee can be implemented with full exchange of animals for the best benefit for the sub-species.

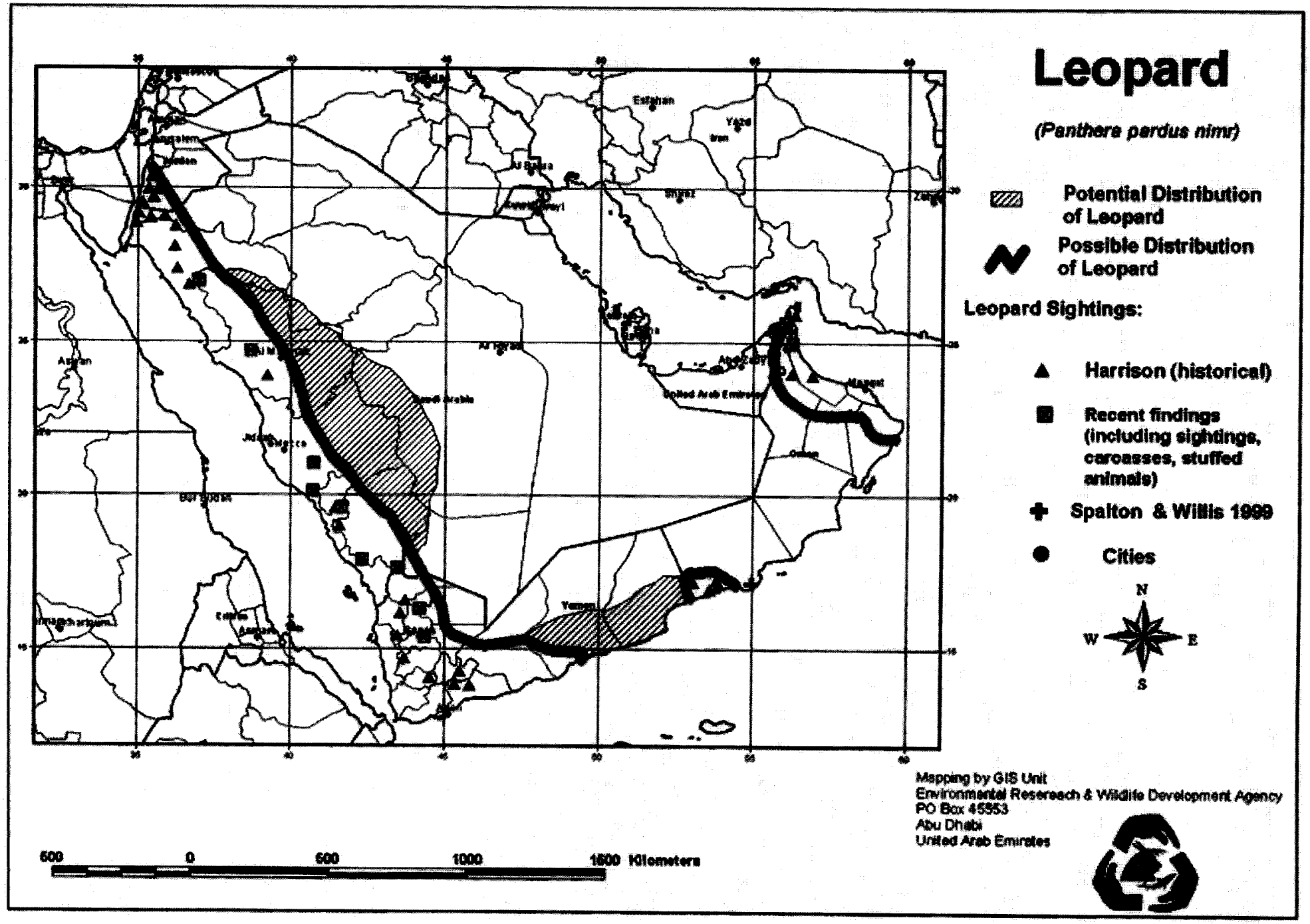
Part Four

21. Sources:

Nahil Abdul Atif Abadi (1993): Wild Mammals of Yemen, Part 1
Nowell, K. and Jackson, P. (1996): Wild Cats Status, Survey and Conservation Action Plan, IUCN, Switzerland
Harrison, D.L. and Bates, P.J.J. (1991): The Mammals of Arabia, 2nd Edition. Harrison Zoological Museum, Sevenoaks, U.K.
Nader and Paillat (1999)
Walter, O. and Stubbington, T. (2000): Studbook listing for the Arabian leopard 31.01.2000. Breeding Centre for Endangered Arabian Wildlife, Sharjah. U.A.E.
Fisher, M. et.al. (Eds) (1999): Tha Natural History of Oman. Festschriftfur Midael Gallaghes. Backhuyse Publisher, Leiden. Pages 147-160.

22. Compilers Alexander Sliwa, Peter Wright, Abdulrahman Khoja, Ali Mohammed Albar, Sean McKeown, Gea Olbricht, Hana al Suwaidi, Ghalia al Midfa, Hussein Al-Gunied, Sami Abdullah Gargash, Sadek Yehia Al-Osimi, Teague Stubbington, Olivia Walter, Amrita De Soyza, Fred Launay, Andrew Spalton, Jaap Wensvroot, Peter Jackson

23. Reviewers


Leopard
(Panthera pardus nimr)
Potential Distribution of Leopard
Possible Distribution of Leopard
Leopard Sightings:
Harrison (historical)
Recent findings (including sightings, carcasses, stuffed animals)
Spalton & Willis 1999
Cities
N
W
E
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Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates
600 0 600 1000 1600 Kilometers

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Vormela peregusna*	Gulderstaedt	1770
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date

1B. Family: Mustelidae

1C. CommonNames: Marbled Polecat (English); Nims mubakka (Arabic)

1D.Taxonomic level: Species

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Scrubby brush, foothills, paleatic??

2C. Niche: Unknown

2D. Historical distrib: One Record- Jordan/ Saudi Arabian border 1990 al Turayf

2E. Current countries: Northeastern Saudi Arabia

2F. Current regional: Northeastern Saudi Arabia

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: Unknown

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: Unknown

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute
Unknown

5A. Population Locations are: Unknown
Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☐
If yes, describe:

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): Unknown over how many years:
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): Unknown over how many years:

6D. State primary cause of change: Unknown

6E. Is there any change in the quality of the habitat where the taxon occurs ☐
If yes, Describe:

6F. State primary cause of change:

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced	Present	Future	Decline	Notes on future threat
Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐
Notes: Unknown

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) Unknown

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Field study ☐ Informal sightings ☐ Indirect information ☐ Museum records ☐ Literature ☐ Hearsay/belief

Notes: Private capture

12. Recent Field Studies

Researcher names	Location	Dates	Topics
None			

Part Two

13. Status

13A. IUCN Status: Not evaluated Based on:

13B. Cites: None 13C. Natl wildlife Legislation

13D. Natl Red Data Book:None 13E. Intl Red Data Book

13F. Other legislation:

13G. Protected area presence:

13H. Endorsed protection plan:

Notes: Species record is variant in the opinion of the working group.

Part Three

14. Supporting Research Is research recommended for taxon? ☐ (Yes)

Specify:

☐ Genetic research ☐ Taxonomic research ☐ Life history
☐ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes:

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☑ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☐ Public awareness ☐ Address policy makers ref needs of local people
☐ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes: KSA- compilation of anecdotal records.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☐ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☐ (Yes)

17A. Names of facilities:

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
0	0	0	0	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments:

Part Four

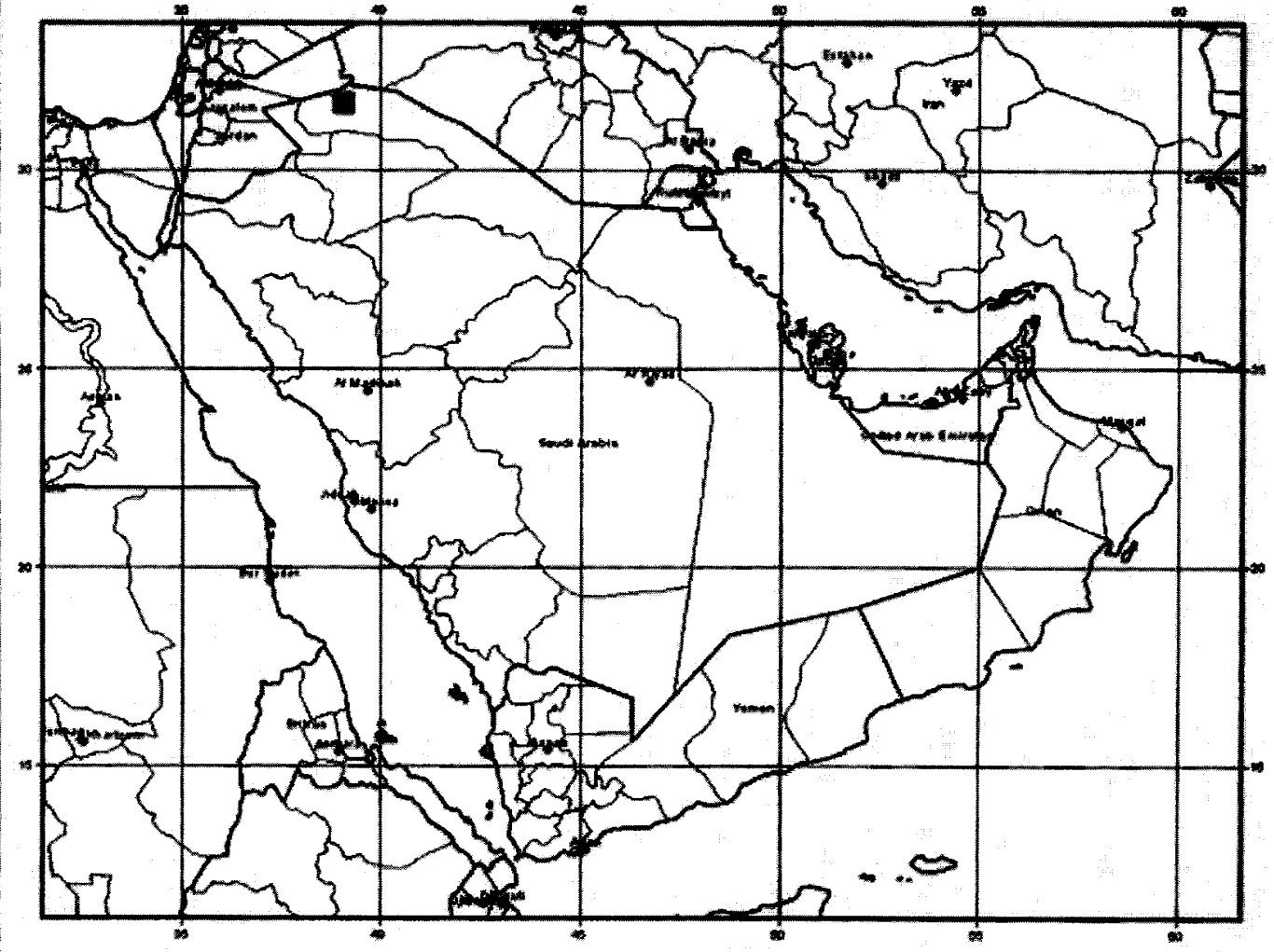
21. Sources: Nader, I.A. (1991): First record of the marbled polecat, Vormela peregusna, for Saudi Arabia. Fauna of Saudi Arabia, 12: 416-419
Abel and Griffith (1999)

22. Compilers Iyad Nader, Reza Khan, Philip Seddon, Peter Phelan, Patrick Paillat, Chris drew, Mike Smith, Robert Llewellyn-Smith, Peter McKinney, Gary Feulner

23. Reviewers

Marbled Polecat

(Vormela peregusna)



■ **Single Live animal Nader 1991**

● **Cities**

N
W E
S

500 0 500 1000 1500 Kilometers

Mapping by Gis Unit
Environmental Reserech & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Vulpes cana*	Blanford	1877
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date

1B. Family: Canidae

1C. CommonNames:
Afghan fox
Blanford's fox
Hoary fox
King fox
Rock fox
Steppe fox
Tha'leb sakhari — Arabic

1D.Taxonomic level: Species

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Rocky mountainous areas; wadis

2C. Niche: 100- 2000 meter altitude, small caves, rocky cracks

2D. Historical distrib: Rocky mountainous areas across Arabian Peninsula

2E. Current countries: Oman, United Arab Emirates, Saudi Arabia, Yemen

2F. Current regional: Oman, United Arab Emirates, Saudi Arabia, Yemen (? Reported)

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute

5A. Population Locations are: Contiguous
Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☑
If yes, describe: Decrease in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): < 20% over how many years: 10
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change: Human incursion, agriculture, quarrying, roads

6E. Is there any change in the quality of the habitat where the taxon occurs ☑
If yes, Describe: Decrease in quality

6F. State primary cause of change: Human activity

Notes:

7. Threats

Human interference	Present	Future	Lead to decline	Notes on future threat
Natural/man induced	Present	Future	Decline	Notes on future threat
disease	☑	☑	☑	Rabies, toxoplasmosis, canine distemper
interspecific competition	☑	☑	☑	
Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Loss of habitat, Poisoning, hunting and trapping- all are present and future threats and will result in predicted population decline

8. Trade:

8A. Is the taxon in trade: ☑(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☑ International

8B. Parts in Trade: Hair
Skin

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline
Trade is only in Afghanistan.

9. Population number

9A. Global Population Unknown

9B. Regional Population <10,000

9C. Number of Mature Individuals (all populations) Unknown

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☑ (Yes)

If yes, specify rate: <20% Period of decline 10 years

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☑ Field study ☐ Informal sightings ☐ Indirect information ☐ Museum records ☐ Literature ☐ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
Breeding Centre for Endangered Arabian Wildlife, Sharjah		1997-2000	Status and distribution
BCEAW, Sharjah		1999	Toxoplasmosis
BCEAW, Sharjah		2000	Home range size
Arabian Leopard Trust, Ras al Kaimah		1999- 2000	General Study
BCEAW, Sharjah		2000	camera trapping to assess status and distribution
BCEAW, Sharjah		2000	blood sampling to assess subspecific status and disease survey

Part Two

13. Status

13A. IUCN Status: Vulnerable Based on: C 1+2a

13B. Cites: II 13C. Natl wildlife Legislation Ban on hunting in United Arab Emirates and Oman

13D. Natl Red Data Book: No 13E. Intl Red Data Book

13F. Other legislation:

13G. Protected area presence: No

13H. Endorsed protection plan: No

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:
☑ Genetic research ☑ Taxonomic research ☑ Life history
☑ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific) NCWD in KSA- cage trapping, presence/absence to assess range- particularly western hills. Oman/Yemen- assess distribution, confirm presence
UAE- habitat use, interspecific competition, observation and camera trapping, leopard scat analysis to determine if fox are prey spp for leopard.

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: Not recommended

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☑ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☑ Public awareness ☐ Address policy makers ref needs of local people
☑ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes: UAE- persistence in areas and population trends
UAE- raise profile and public awareness through captive breeding and exhibition.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☑ Education ☐ Reintroduction ☐ Benign introduction
☑ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Arabian Wildlife Centre, Sharjah, United Arab Emirates

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
3	3	0	6	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries No

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries No

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Some techniques known for taxon or similar taxon

20. Other Comments:

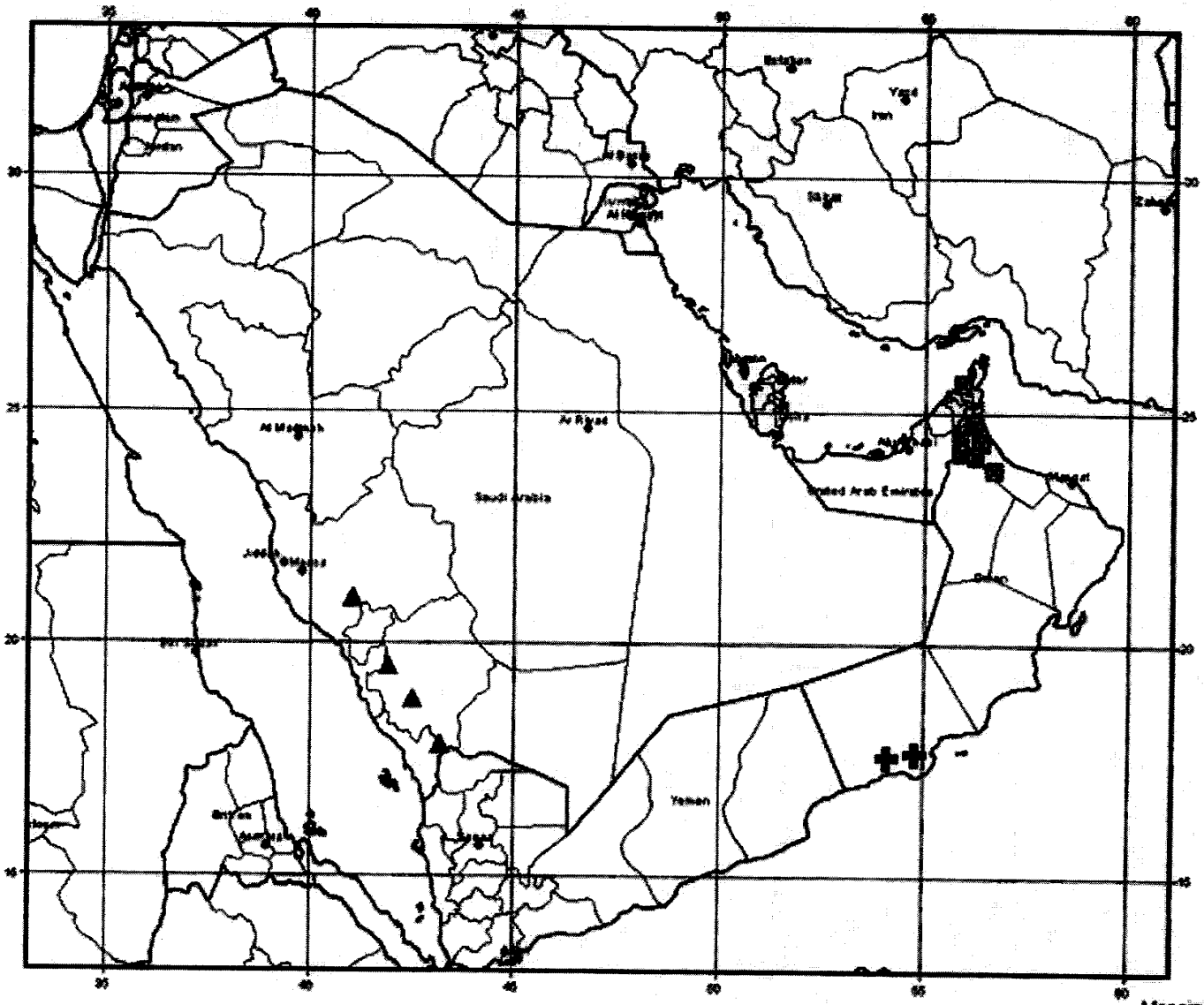
Part Four

21. Sources:

Harrison and Bates (1991)
Geffin et.al. (1993)
McDonald and Tattersall (1996)
Stewart and Stewart (1995)
NCWD unpublished data
Smith et.al in press (2000)
Kingdon, J. (1991): Arabian Mammals: A Natural History. Academic Press, London, U.K. pages 95-97 and 225
Roberts, T.J. (1997): The Mammals of Pakistan, Oxford University Press, pages 193-196
Nowak, R.M. (1999): Walker's Mammals of the World, 6th Edition. Johns Hopkins University Press, pages 790-791.
Stuart, C. & T. (1995): Minute to Midnight. Report of a scientific survey on the status of indigenous wildlife in the United Arab Emirates executed on behalf of the Arabian Leopard Trust.

22. Compilers Peter Phelan, Mike Smith, Reza Khan, Philip Seddon, Chris Drew, Patrick Paillat, Gary Feulner, Peter McKinney, Iyad Nader, Robert Llewellyn-Smith

23. Reviewers



Blanford's Fox

(Vulpes cana)

- NCWCD Sightings & Trapped Animals (1985)
- Oman Photographed Animal (Spalton)
- Stuart & Stuart 1995 Smith et al., 2000 (in press)
- Cities

N
W E
S

500 0 500 1000 1500 Kilometers

Mapping by GIS Unit
Environmental Reserach & Wildlife Development Agency
Po Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

1.Scientific Name:	*Vulpes rueppelli*	Schinz	1825
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Canis rupelii (sic)	Schinz	1825
1B. Family:	Canidae		
1C. CommonNames:	Rueppel's Sand Fox	English	
	Sand fox	English	
	Tha'lab al remmal	Arabic	
1D.Taxonomic level:	Species		

2. Distribution of the Taxon

2A.Life form (plant):	
2B. Habitat:	Sand/ Gravel desert
2C. Niche:	Lower elevations, interdunal areas.
2D. Historical distrib:	Central sand deserts. Saudi Arabia, Oman, United Arab Emirates, Yemen
2E. Current countries:	Saudi Arabia, Oman, United Arab Emirates, Yemen
2F. Current regional:	Central sand deserts.
2G Migration regions:	

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute

One contiguous population except Abu Dhabi populations which are fragmented.

5A. Population Locations are: Contiguous

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☐

If yes, describe: Stable in Area

6B. If decreasing, what has been the decrease in Habitat area

approximate change (%): over how many years:

Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat

approximate change (%): < 20% over how many years:

6D. State primary cause of change: Stable except in UAE where development, agriculture, gravel extraction and roads cause the primary change in habitat.

6E. Is there any change in the quality of the habitat where the taxon occurs ☑

If yes, Describe: Decrease in quality

6F. State primary cause of change: Development, agriculture, gravel extraction and roads.

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced interspecific competition	☑	☑	☑	
Catastrophic				

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Hunting, Grazing, Pesticides, Poisoning and Road kills are considered present and future threats leading to a decline in population primarily in the UAE.

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population Unknown

9C. Number of Mature Individuals (all populations) >2500

9D. Generation time Unknown

10. Population trends

10A. Trends in Pop size: Stable

10B. Rate of decline:. 21% to 50% Period of decline 15 yrs in UAE

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes: Stable except in UAE where it is declining.

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☑ Field study ☑ Informal sightings ☐ Indirect information ☐ Museum records ☐ Literature ☑ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
ERWDA- Dhawa, Abu Dhabi, United Arab Emirates- 1999- Rueppel fox study			
ERWDA- Abu Dhabi- 1996 to present- Distribution survey			
NCWCD- Mahazat-as Sayd- 1992 to 1994- Distribution dynamics			
NCWCD- Mahazat-as-Sayd- 1996 to 1998- Distribution dynamics			
NCWCD- Harrat al Harra- 1992 to 1996- Survey/ distribution			
NCWCD (KKWRC)- Thumama area- 1989 to 1990- Radio tracking/ biology			

Part Two

13. Status

13A. IUCN Status: Lower risk - near threatened Based on: in UAE category is Vu based on C1

13B. Cites: not mentioned 13C. Natl wildlife Legislation No

13D. Natl Red Data Book:No 13E. Intl Red Data Book Data Deficient

13F. Other legislation:

13G. Protected area presence: KSA- Harrat al Harra, Al- Kunfah, Mahazat-as-Sayd, Uruq Bani Ma'arid, Thummah; Oman- White Oryx Sanctuary

13H. Endorsed protection plan:None

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☐ (Yes)

Specify:

☑ Survey studies	☐ Genetic research	☐ Taxonomic research	☑ Life history
	☐ Limiting factor research	☐ Epidemiology	☐ Trade

Othes (taxon specific) KSA- NCWCD- Focus on protected areas, cage trapping (ongoing); UAE- ERWDA- general surveys to assess distribution; UAE (Abu Dhabi)- ERWDA- trapping and sampling; KSA (NWRC) on going programme in Maharat-as-Sayd to assess recovery of population after rabies. Virology and pesticide accumulation. KSA- studies of competition with red fox; in UAE life history studies of status and threats.

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes:

15. Management recommendations for the taxon *Specify:*

☐ Habitat management	☐ Wild pop management	☑ Monitoring	☐ Work in local communities
☐ Sustainable utilization	☐ Translocation	☑ Public awareness	☐ Address policy makers ref needs of local people
☑ Ex situ breeding	☐ Genome Resource	☐ Limiting factor	

Notes: UAE- maintain captive population for public awareness. Monitor populations for persistence in KSA protected areas and monitor status in Abu Dhabi.

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery	☑ Education	☐ Reintroduction	☐ Benign introduction
☐ Research	☐ Husbandry	☐ Preservation of live genome	

Notes/other

17. Do ex situ stocks already exist ☐ (Yes)

17A. Names of facilities: Dubai Zoo, Arabian Wildlife Centre, Shajah

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
2	5	0	7	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries No

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries No

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments:

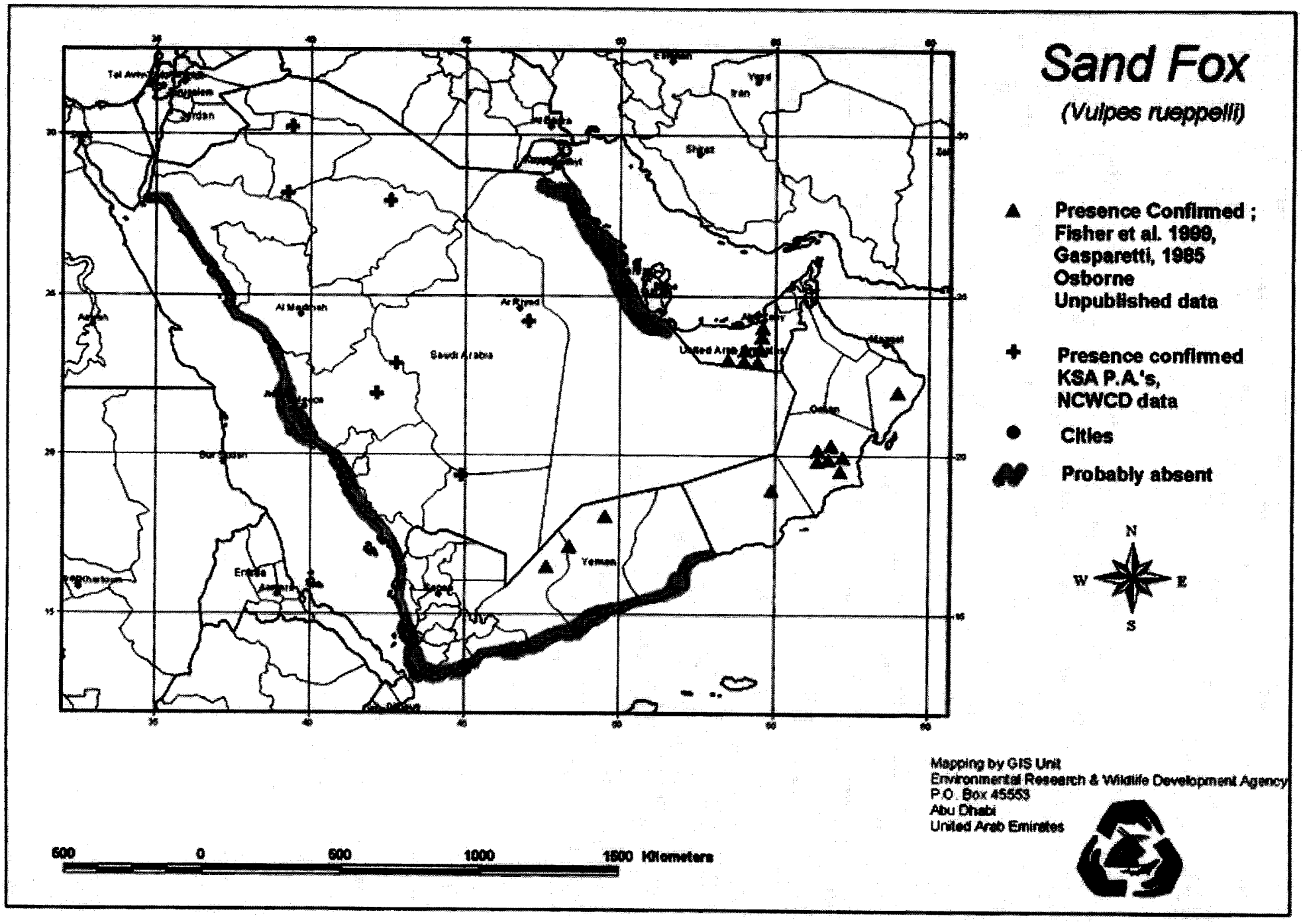
Part Four

21. Sources:

Harrison and Bates (1991)
Nader (1990)
Lariviere & Seddon (in press)
Osborne (1996): Desert Ecology of Abu Dhabi. A review and recent studies. Pisces Publications, Newbury, U.K.
ERWDA (in press)
Fisher, et. al. (1999): The Natural History of Oman. Backhuyse pubs. Leiden, Germany.

22. Compilers Mike Smith, Reza Khan, Peter Phelan, Peter McKinney, Robert Llewellyn-Smith, Iyad Nader, Chris Drew, Patrick Paillat, Philip Seddon, Gary Feulner

23. Reviewers


Sand Fox
(Vulpes rueppelli)
Presence Confirmed ; Fisher et al. 1999, Gasparetti, 1985 Osborne Unpublished data
Presence confirmed KSA P.A's, NCWCD data
Cities
Probably absent
N
W
E
S
Saudi Arabia
Yemen
Oman
Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
P.O. Box 45553
Abu Dhabi
United Arab Emirates
600 0 600 1000 1500 Kilometers

Conservation Assessment Management Plan
Taxon Data Sheet

Vulpes vulpes **Red Fox**

1.Scientific Name:	*Vulpes vulpes*	Linnaeus	1758
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
1B. Family:	Canidae		
1C. CommonNames:	Red fox	English	
	Thaleb ahmar	Arabic	
1D.Taxonomic level:			

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Everywhere on Arabian peninsula except sand sea areas

2C. Niche:

2D. Historical distrib: United Arab Emirates, Oman, Saudi Arabia, Yemen. Qatar, Kuwait

2E. Current countries: United Arab Emirates, Oman, Saudi Arabia, Yemen, Qatar, Kuwait

2F. Current regional:

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area: > 20,000 sq km

Notes (Occurrence)

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy: > 2,001 sq km

Notes (Occupancy)

5. No. of Locations or Subpopulations in which the taxon is distribute
Widespread

5A. Population Locations are: Contiguous

Notes:

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☐

If yes, describe: Stable in Area

6B. If decreasing, what has been the decrease in Habitat area

approximate change (%): over how many years:

Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat

approximate change (%): over how many years:

6D. State primary cause of change:

6E. Is there any change in the quality of the habitat where the taxon occurs ☑

If yes, Describe: Increase in quality

6F. State primary cause of change: Adaptable animal living in and around settlements

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced disease	☑	☑	☐	Rabies, mange
Catastrophic				

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐

Notes: Poisoning and road kills are present and future threats but will not result in decline

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☐ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline

9. Population number

9A. Global Population Unknown

9B. Regional Population Considerable

9C. Number of Mature Individuals (all populations) > 10,000

9D. Generation time

10. Population trends

10A. Trends in Pop size: Increasing

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☑ Field study ☐ Museum records ☐ Informal sightings ☑ Literature ☐ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics
NCWCD- Mahzat- As- Sayd-	1992-1994-	Population dynamics of foxes	
NCWCD- Harrat al Harra-	1992-1996-	Survey/ Distribution studies	
NCWCD- KKWRC- Thumama Area-	1989-1990-	Radio Tracking/ Biology	
ERWDA- Abu Dhabi-	1996- Present-	Distribution Survey	

Part Two

13. Status

13A. IUCN Status: Lower risk - least concern Based on:

13B. Cites: III 13C. Natl wildlife Legislation Periodic bounties

13D. Natl Red Data Book: No 13E. Intl Red Data Book No

13F. Other legislation:

13G. Protected area presence: All terrestrial protected areas

13H. Endorsed protection plan: No

Notes:

Part Three

14. Supporting Research Is research recommended for taxon? ☐ (Yes)

Specify:
☐ Genetic research ☐ Taxonomic research ☐ Life history
☐ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific)

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes:

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☐ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☐ Public awareness ☐ Address policy makers ref needs of local people
☐ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes:

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☐ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Dubai Zoo- UAE; Private Collections; Arabia's Wildlife Centre- UAE; Riyadh Zoo

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
6	4	0	0	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries No

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries Regional

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

20. Other Comments:

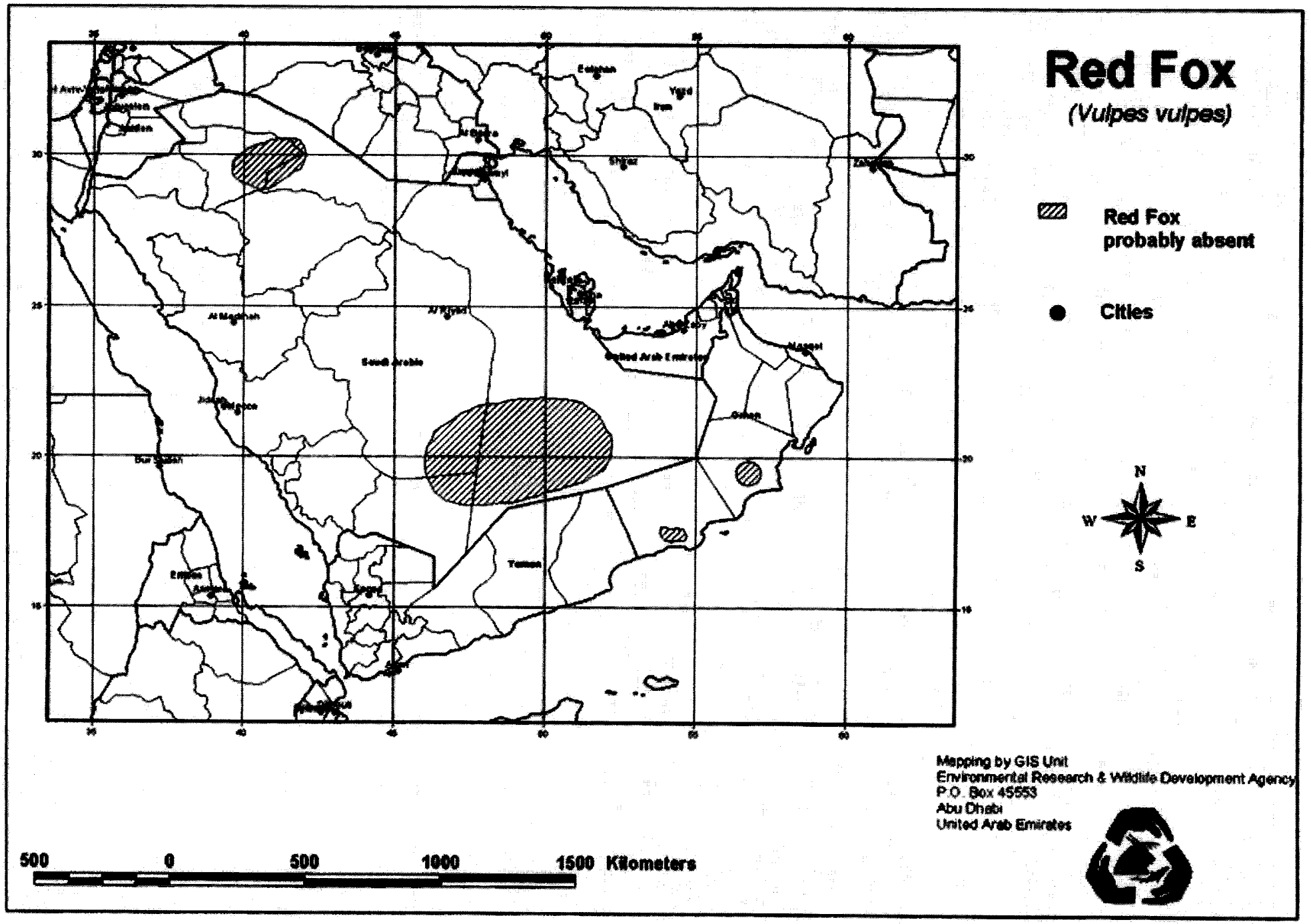
Part Four

21. Sources:

Harrison & Bates- 1991
Gasperetti- 1985
Nader- 1990
Osborne- 1996
Kingdon, J. (1991): Arabian Mammals: A Natural History. Academic Press, London, U.K. pages 95-97 and 225
Roberts, T.J. (1997): The Mammals of Pakistan, Oxford University Press, pages 193-196.
Nowak, R.M. (1999) Walker's Mammals of the World, 6th Edition. The Johns Hopkins University Press, pages 790-791.

22. Compilers Reza Khan, Iyad Nader, Mike Smith, Robert Llewellyn-Smith, Philip Seddon, Gary Feulner, Peter McKinney, Patrick Paillat, Peter Phelan, Christopher Drew

23. Reviewers


Red Fox
(Vulpes vulpes)
Red Fox probably absent
Cities
N
W
E
S
500 0 500 1000 1500 Kilometers
Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
P.O. Box 45553
Abu Dhabi
United Arab Emirates

Conservation Assessment Management Plan
Taxon Data Sheet

Vulpes zerda **Fennec fox**

1.Scientific Name:	*Vulpes zerda*	Zimmerman	1780
1A. Synonyms:	Scientific synonym / ambiguities	Authority	Date
	Canis zerda	Zimmerman	1780
1B. Family:	Canidae		
1C. CommonNames:	Fennec fox	English	
	Thaaleb al fenec	Arabic	
1D.Taxonomic level:	Species		

2. Distribution of the Taxon

2A.Life form (plant):

2B. Habitat: Sand Dunes- Highly desert adapted

2C. Niche:

2D. Historical distrib: Kuwait- 2 records from 1932, no other data

2E. Current countries: No record from 1980's onward

2F. Current regional: Not known in last 20 years

2G Migration regions:

3. Approximate Area of Occurrence of the taxon in and around the area of study/ sighting/ collection

(Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary encompassing all known, inferred or projected sites of present occurrence of the taxon)

Occurrence area:

Notes (Occurrence) No records

4. Approximate Area of Occupancy of the taxon in and around the area of study/ sighting/ collection

(Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence')

Area of Occupancy:

Notes (Occupancy) No records

5. No. of Locations or Subpopulations in which the taxon is distribute
None

5A. Population Locations are:
Notes: No change in habitat status.

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs ☐
If yes, describe: Stable in Area

6B. If decreasing, what has been the decrease in Habitat area
approximate change (%): over how many years:
Notes on decrease:

6C. If stable or unknown, do you predict a decline in habitat
approximate change (%): over how many years:

6D. State primary cause of change:

6E. Is there any change in the quality of the habitat where the taxon occurs ☐
If yes, Describe: Stable

6F. State primary cause of change:

Notes:

7. Threats

	Present	Future	Lead to decline	Notes on future threat
Human interference				
Natural/man induced	Present	Future	Decline	Notes on future threat
Catastrophic	Present	Future	Decline	Notes on future threat

7B. Are threats resulting in (perceived or inferred) or may result in (predicted) population declin ☐
Notes: Poisoning is a current threat and hunting is a possible threat.

8. Trade:

8A. Is the taxon in trade: ☐(Yes) Type of trade: ☑ Local ☐ Commercial ☐ Domestic ☐ International

8B. Parts in Trade:

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline
Regional

9. Population number

9A. Global Population

9B. Regional Population Probably extinct

9C. Number of Mature Individuals (all populations)

9D. Generation time

10. Population trends

10A. Trends in Pop size: Unknown

10B. Rate of decline:. Period of decline

10C. If stable or unknown, do you predict a future decline in population ☐ (Yes)

If yes, specify rate: Period of decline

Notes:

11. Data quality

11A. Estimates base on: ☐ Census or monitoring ☐ Indirect information ☐ Field study ☑ Museum records ☐ Informal sightings ☑ Literature ☐ Hearsay/belief

Notes:

12. Recent Field Studies

Researcher names	Location	Dates	Topics

Part Two

13. Status

13A. IUCN Status: Extinct in the wild Based on: No animal records

13B. Cites: II 13C. Natl wildlife Legislation None

13D. Natl Red Data Book: None 13E. Intl Red Data Book

13F. Other legislation: No

13G. Protected area presence: No

13H. Endorsed protection plan: No

Notes: Need to identify origin of captive stock.

Part Three

14. Supporting Research Is research recommended for taxon? ☑ (Yes)

Specify:
☑ Genetic research ☑ Taxonomic research ☐ Life history
☑ Survey studies ☐ Limiting factor research ☐ Epidemiology ☐ Trade

Othes (taxon specific) Survey to confirm it is actually extinct.

14A. Is Population and Habitat Viability Assessment recommended ☐(Yes)

Notes: Not recommended.

15. Management recommendations for the taxon *Specify:*

☐ Habitat management ☐ Wild pop management ☐ Monitoring ☐ Work in local communities
☐ Sustainable utilization ☐ Translocation ☐ Public awareness ☐ Address policy makers ref needs of local people
☐ Ex situ breeding ☐ Genome Resource ☐ Limiting factor

Notes:

16. Ex situ management recommendations *If Ex situ breeding recommended in Q15, is it for:*

☐ Species recovery ☐ Education ☐ Reintroduction ☐ Benign introduction
☐ Research ☐ Husbandry ☐ Preservation of live genome

Notes/other Maintain awareness of the possibility of Fennec on sandy regions of peninsula in conjunction

17. Do ex situ stocks already exist ☑ (Yes)

17A. Names of facilities: Riyadh Zoo

17B. No. in captivity:

Males	Females	Unsexed:	Total	Not known
0	0	0	0	☐

17C. Does a coordinated species management program exist for this species: ☐ (Yes)

If yes, specify countries

17D. Is a coordinated Species Management Program recomended for range country(ies)? ☐(Yes)

If yes, specify countries

18. Level of ex situ management recommended

19. Are techniques extablished to propagate the taxon:

Techniques known for this taxon or similar taxon

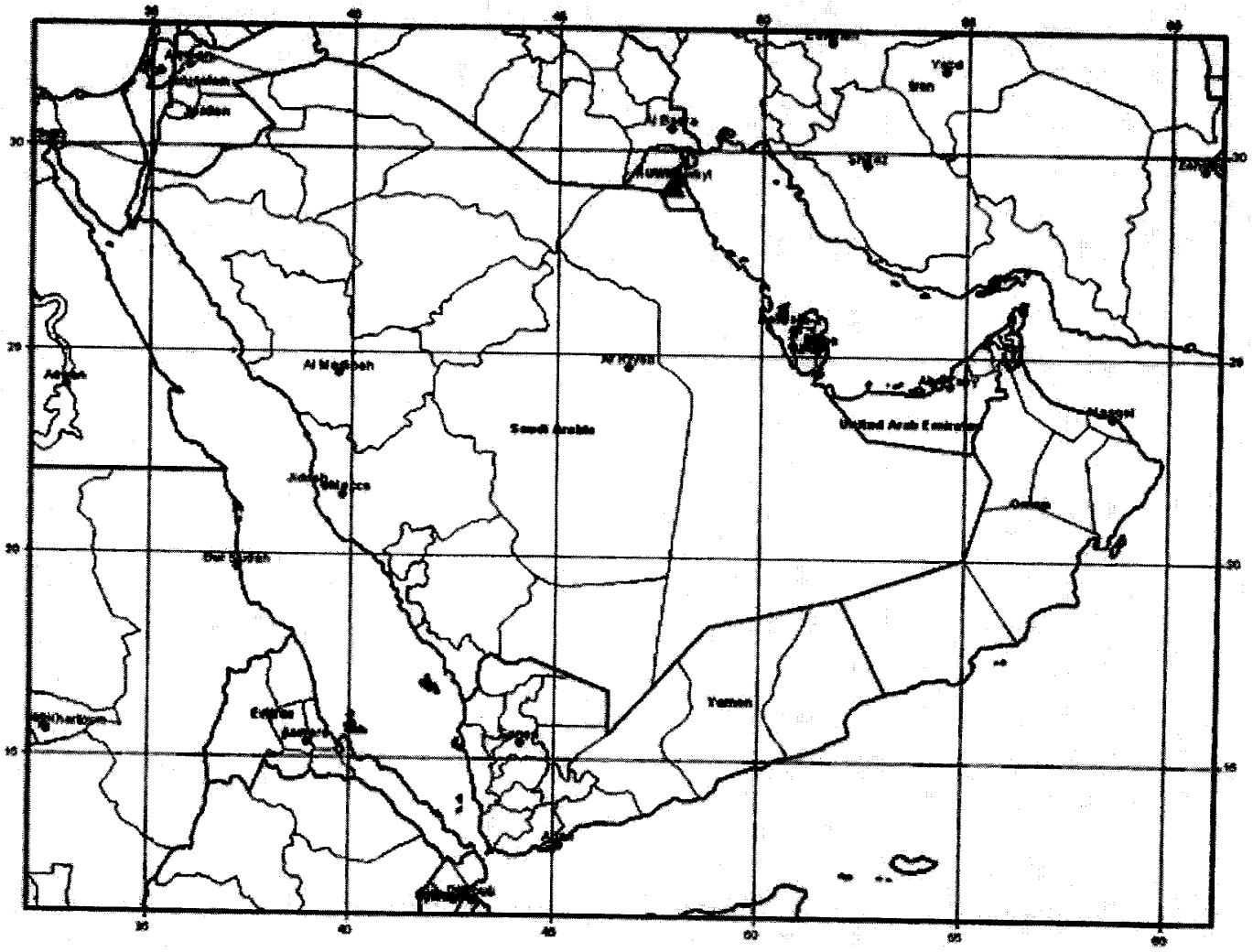
20. Other Comments:

Part Four

21. Sources: Harrison, D.L. and Bates, P.J.J. (1991): The Mammals of Arabia, Harrison Zoological Museum, Sevenoaks, U.K. page 354.

22. Compilers Phillip Seddon, Peter Phelan, Iyad Nader, Patrick Paillat, Christopher Drew, Gary Feulner, Peter McKinney, Reza Khan, Robert Llewellyn-Smith, Mike Smith

23. Reviewers



Fennec Fox

(Vulpes zerda)

▲ **Single Specimen Collected 1932, Harrison & Bates 1991**

● **Cities**

Mapping by GIS Unit
Environmental Research & Wildlife Development Agency
PO Box 45553
Abu Dhabi
United Arab Emirates

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP)
FOR
ARABIAN CARNIVORES
&
POPULATION AND HABITAT VIABILITY ASSESSMENT (PHVA)
FOR THE
ARABIAN LEOPARD AND TAHR

SECTION 7

IUCN NEW RED LIST CATEGORIES AND CRITERIA

CBSG CAMP and PHVA Workshop Processes

Conservation Breeding Specialist Group

Species Survival Commission
IUCN -- The World Conservation Union
U.S. Seal, CBSG Chairman

CBSG Workshop and Training Processes

Information on capabilities of the Conservation Breeding Specialist Group (CBSG/SSC/IUCN)

Introduction

There is a lack of generally accepted tools to evaluate and integrate the interaction of biological, physical, and social factors on the population dynamics of threatened species and populations. There is an urgent need for tools and processes to characterize the risk of species and habitat extinction, on the possible impacts of future events, on the effects of management interventions, and on how to develop and sustain learning-based cross-institutional management programs.

The Conservation Breeding Specialist Group (CBSG) of IUCN's Species Survival Commission (SSC) has 10 years of experience in developing, testing and applying a series of scientifically based tools and processes to assist risk characterization and species management decision making. These tools, based on small population and conservation biology (biological and physical factors), human demography, and the dynamics of social learning are used in intensive, problem-solving workshops to produce realistic and achievable recommendations for both *in situ* and *ex situ* population management.

Our Workshop processes provide an objective environment, expert knowledge, and a neutral facilitation process that supports sharing of available information across institutions and stakeholder groups, reaching agreement on the issues and available information, and then making useful and practical management recommendations for the taxon and habitat system under consideration. The process has been remarkably successful in unearthing and integrating previously unpublished information for the decision making process. Their proven heuristic value and constant refinement and expansion have made CBSG workshop processes one of the most imaginative and productive organizing forces for species conservation today (Conway 1995).

Integration of Science, Management, and Stakeholders

The CBSG PHVA Workshop process is based upon biological and sociological science. Effective conservation action is best built upon a synthesis of available biological information, but is dependent on actions of humans living within the range of the threatened species as well as established national and international interests. There are characteristic patterns of human behavior that are cross-disciplinary and cross-cultural which affect the processes of communication, problem-solving, and collaboration: 1) in the acquisition, sharing, and analysis of information; 2) in the perception and characterization of risk; 3) in the development of trust among individuals; and 4) in 'territoriality' (personal, institutional, local, national). Each of these has strong emotional components that shape our

interactions. Recognition of these patterns has been essential in the development of processes to assist people in working groups to reach agreement on needed conservation actions, collaboration needed, and to establish new working relationships.

Frequently, local management agencies, external consultants, and local experts have identified management actions. However, an isolated narrow professional approach which focuses primarily on the perceived biological problems seems to have little effect on the needed political and social changes (social learning) for collaboration, effective management and conservation of habitat fragments or protected areas and their species components. CBSG workshops are organized to bring together the full range of groups with a strong interest in conserving and managing the species in its habitat or the consequences of such management. One goal in all workshops is to reach a common understanding of the state of scientific knowledge available and its possible application to the decision-making process and to needed management actions. We have found that the decision-making driven workshop process with risk characterization tools, stochastic simulation modeling, scenario testing, and deliberation among stakeholders is a powerful tool for extracting, assembling, and exploring information. This process encourages developing a shared understanding across wide boundaries of training and expertise. These tools also support building of working agreements and instilling local ownership of the problems, the decisions required, and their management during the workshop process. As participants appreciate the complexity of the problems as a group, they take more ownership of the process as well as the ultimate recommendations made to achieve workable solutions. This is essential if the management recommendations generated by the workshops are to succeed.

Participants have learned a host of lessons in more than 100 CBSG Workshop experiences in nearly 40 countries. Traditional approaches to endangered species problems have tended to emphasize our lack of information and the need for additional research. This has been coupled with a hesitancy to make explicit risk assessments of species status and a reluctance to make immediate or non-traditional management recommendations. The result has been long delays in preparing action plans, loss of momentum, dependency on crisis-driven actions or broad recommendations that do not provide useful guidance to the managers.

CBSG's interactive and participatory workshop approach produces positive effects on management decision-making and in generating political and social support for conservation actions by local people. Modeling is an important tool as part of the process and provides a continuing test of assumptions, data consistency, and of scenarios. CBSG participants recognize that the present science is imperfect and that management policies and actions need to be designed as part of a biological and social learning process. The Workshop process essentially provides a means for designing management decisions and programs on the basis of sound science while allowing new information and unexpected events to be used for learning and to adjust management practices.

Workshop Processes and Multiple Stakeholders

Experience: The Chairman and three Program Officers of CBSG have conducted and facilitated more than 100 species and ecosystem Workshops in 40 countries including the USA during the past 6 years. *Reports from these workshops are available from the CBSG Office.* We have worked on a continuing basis with agencies on specific taxa (e.g., Florida panther, Sumatran tiger) and have assisted in the development of national conservation strategies for other taxa (e.g., Sumatran elephant, Sumatran tiger, Indonesia). Our *Population Biology Program Officer (Dr. P. Miller)* received his doctoral training with Dr. P. Hedrick and has experience with the genetic and demographic aspects of a range of vertebrate species. He has worked extensively with *VORTEX* and other population simulation models.

Facilitator's Training and Manual: A manual has been prepared to assist CBSG Workshop conveners, collaborators, and facilitators in the process of organizing, conducting, and completing a CBSG workshop. It was developed with the assistance of two management science professionals and 30 people from 11 countries with experience in CBSG Workshops. These facilitator's training workshops have proven very popular with 2 per year planned through 2000 in several countries including the USA. *Copies of the Facilitator's Manual are available from the CBSG Office.*

Scientific Studies of Workshop Process: The effectiveness of these workshops as tools for eliciting information, assisting the development of sustained networking among stakeholders, impact on attitudes of participants, and in achieving consensus on needed management actions and research has been extensively debated. We initiated a scientific study of the process and its long term aftermath four years ago in collaboration with an independent team of researchers (Vredenburg et al. 1999). A survey questionnaire is administered at the beginning and end of each workshop. They have also conducted extensive interviews with participants in workshops held in five countries. *Three manuscripts on CBSG Workshop processes and their effects are available from the team and the CBSG office.* The study also is undertaking follow up at one and two years after each workshop to assess longer-term effects. To the best of our knowledge there is no comparable systematic scientific study of conservation and management processes. *We will apply the same scientific study tools to the workshops in this program and provide an analysis of the results after the workshop.*

CBSG Workshop Toolkit

Our basic set of tools for workshops include: small group dynamic skills; explicit use in small groups of problem restatement; divergent thinking sessions; identification of the history and chronology of the problem; causal flow diagramming (elementary systems analysis); matrix methods for qualitative data and expert judgements; paired and weighted ranking for making comparisons between sites, criteria, and options; utility analysis; stochastic simulation modeling for single populations and metapopulations; and deterministic and stochastic modeling of local human populations. Several computer packages are used to assist collection and analysis of information with these tools. We provide training in several of these tools in each workshop as well as intensive special training workshops for people wishing to organize their own workshops.

Stochastic Simulation Modeling

Integration of Biological, Physical and Social Factors: The Workshop process, as developed by CBSG, generates population and habitat viability assessments based upon in-depth analysis of information on the life history, population dynamics, ecology, and history of the populations. Information on demography, genetics, and environmental factors pertinent to assessing population status and risk of extinction under current management scenarios and perceived threats are assembled in preparation for and during the workshops. Modeling and simulations provide a neutral externalization focus for assembly of information, identifying assumptions, projecting possible outcomes (risks), and examining for internal consistency. Timely reports from the workshop are necessary to have impact on stakeholders and decision makers. Draft reports are distributed within 3-4 weeks of the workshop and final reports within about 3 months.

Human Dimension: We have collaborated with human demographers in 5 CBSG workshops on endangered species and habitats. They have utilized computer models incorporating human population characteristics and events at the local level in order to provide projections of the likely course of population growth and the utilization of local resources. This information was then incorporated into projections of the likely viability of the habitat of the threatened species and used as part of the population

projections and risk assessments. We are preparing a series of papers on the human dimension of population and habitat viability assessment. It is our intention to further develop these tools and to utilize them as part of the scenario assessment process.

Risk Assessment and Scenario Evaluation: A stochastic population simulation model is a kind of model that attempts to incorporate the uncertainty, randomness or unpredictability of life history and environmental events into the modeling process. Events whose occurrence is uncertain, unpredictable, and random are called stochastic. Most events in an animal's life have some level of uncertainty. Similarly, environmental factors, and their effect on the population process, are stochastic - they are not completely random, but their effects are predictable within certain limits. Simulation solutions are usually needed for complex models including several stochastic parameters.

There are a host of reasons why simulation modeling is valuable for the workshop process and development of management tools. The primary advantage, of course, is to simulate scenarios and the impact of numerous variables on the population dynamics and potential for population extinction. Interestingly, not all advantages are related to generating useful management recommendations. The side-benefits are substantial.

- Population modeling supports consensus and instills ownership and pride during the workshop process. As groups begin to appreciate the complexity of the problems, they have a tendency to take more ownership of the process and the ultimate recommendations to achieve workable solutions.
- Population modeling forces discussion on biological and physical aspects and specification of assumptions, data, and goals. The lack of sufficient data of useable quality rapidly becomes apparent and identifies critical factors for further study (driving research and decision making), management, and monitoring. This not only influences assumptions, but also the group's goals.
- Population modeling generates credibility by using technology that non-biologically oriented groups can use to relate to population biology and the "real" problems. The acceptance of the computer as a tool for performing repetitive tasks has led to a common ground for persons of diverse backgrounds.
- Population modeling explicitly incorporates what we know about dynamics by allowing the simultaneous examination of multiple factors and interactions - more than can be considered in analytical models. The ability to alter these parameters in a systematic fashion allows testing a multitude of scenarios that can guide adaptive management strategies.
- Population modeling can be a neutral computer "game" that focuses attention while providing persons of diverse agendas the opportunity to reach consensus on difficult issues.
- Population modeling results can be of political value for people in governmental agencies by providing support for perceived population trends and the need for action. It helps managers to justify resource allocation for a program to their superiors and budgetary agencies as well as identify areas for intensifying program efforts.

Modeling Tools: At the present time, our preferred model for use in the population simulation modeling process is called *VORTEX*. This model, developed by Bob Lacy (Chicago Zoological Society), is designed specifically for use in the stochastic simulation of the extinction process in small wildlife populations. It has been developed in collaboration and cooperation with the CBSG PHVA process. The model simulates deterministic forces as well as demographic, environmental, and genetic events in relation to their probabilities. It includes modules for catastrophes, density dependence, metapopulation dynamics, and inbreeding effects. The *VORTEX* model analyzes a population in a stochastic and probabilistic fashion. It also makes predictions that are testable in a scientific manner, lending more credibility to the process of using population-modeling tools.

There are other commercial models, but presently they have some limitations such as failing to measure genetic effects, being difficult to use, or failing to model individuals. *VORTEX* has been successfully used in more than 90 PHVA workshops in guiding management decisions. *VORTEX* is general enough for use when dealing with a broad range of species, but specific enough to incorporate most of the important processes. It is continually evolving in conjunction with the PHVA process. *VORTEX* has, as do all models, its limitations, which may restrict its utility. The model analyzes a population in a stochastic and probabilistic fashion. It is now at Version 8.1 through the cooperative contributions of dozens of biologists. It has been the subject of a series of both published and in-press validation studies and comparisons with other modeling tools. More than 2000 copies of *VORTEX* are in circulation and it is being used as a teaching tool in university courses.

We use this model and the experience we have with it as a central tool for the population dynamic aspects of the Workshop process. Additional modules, building on other simulation modeling tools for human population dynamics (which we have used in 3 countries) with potential impacts on water usage, harvesting effects, and physical factors such as hydrology and water diversion will be developed to provide input into the population and habitat models which can then be used to evaluate possible effects of different management scenarios. No such composite models are available.

CBSG Resources as a Unique Asset

Expertise and Costs: The problems and threats to endangered species everywhere are complex and interactive with a need for information from diverse specialists. No agency or country encompasses all of the useful expert knowledge. Thus, there is a need to include a wide range of people as resources and analysts. It is important that the invited experts have reputations for expertise, objectivity, initial lack of local stake, and for active transfer of wanted skills. CBSG has a volunteer network of more than 700 experts with about 250 in the USA. More than 3,000 people from 400 organizations have assisted CBSG on projects and participated in workshops on a volunteer basis contributing tens of thousands of hours of time. We will call upon individual experts to assist in all phases of this project.

Indirect cost contributions to support: Use of CBSG resources and the contribution of participating experts provide a matching contribution more than equaling the proposed budget request for projects.

Manuals and Reports: We have manuals available that provide guidance on the goals, objectives, and preparations needed for CBSG workshops. These help to reduce startup time and costs and allow us to begin work on organizing the project immediately with proposed participants and stockholders. We have a process manual for use by local organizers, which goes into detail on all aspects of organizing, conducting, and preparing reports from the workshops. Draft reports are prepared during the workshop so that there is agreement by participants on its content and recommendations. Reports are also prepared on the mini-workshops (working groups) that will be conducted in information gathering exercises with small groups of experts and stakeholders. We can print reports within 24-48 hours of preparation of final copy. We also have CD-ROM preparation facilities, software and experience.

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Information on CBSG and the CAMP Process.

Within the Species Survival Commission of IUCN - The World Conservation Union, there are approximately 100 Specialist Groups comprised of some 97 taxonomically-based Specialist Groups (e.g., seabird, primate, cactus Specialists Groups) in addition to five disciplinary Specialist Groups: Conservation Breeding (CBSG), Sustainable Use, Veterinary Medicine, Invasive Species and Reintroduction.

The Conservation Breeding Specialist Group (CBSG) is the largest specialist group and is a network of approximately 800 volunteers with expertise in species' recovery planning, small population biology, reproductive and behavioural biology, wild and captive animal management as well as other disciplines. Within the SSC, CBSG's primary goal is to contribute to the development of holistic and viable conservation strategies. CBSG has developed a series of innovative tools, models and workshop processes for risk and status assessment and management/co-ordination of threatened species (Seal 1993; Ellis & Seal 1996). These tools have evolved and been used in a series of nearly 160 workshops over the past six years, with nearly 5,000 participants.

Each workshop is a consensus-building process in which all interested stakeholders participate. Participants are encouraged to leave any personal agenda at the door to focus on a common goal: preventing the extinction of the species or group of species under review. These processes allow for the extraction of knowledge from expert participants, recognising that it is likely that 80% of the information about species usually is in researchers' heads and may never be published. Workshop processes facilitate the validation of each person's experience and perspective. In many cases, people have been working on the same species for years but may never have met face-to-face to discuss pertinent conservation issues. Finally, CBSG acts as a neutral facilitator in these processes. The recommendations are made by and the resultant document is "owned" entirely by the participants. Rapid turnaround is key - generally, a rough draft document is generated by the end of each workshop and a second is in the hands of the participants within several months for further review.

During these workshops, participants attempt to determine what can be done to aid in the recovery of a threatened species or population. There a number of management strategies that can be developed in response to factors affecting populations, ranging from emergency planning, habitat management and population monitoring to education programs. Research activities also are recommended; these can range from investigation of limiting factors to taxonomic research to census and survey.

THE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP) PROCESS

The CAMP process is one of prioritisation, assembling 10 to 40 experts (e.g., wildlife managers, SSC Specialist Group members, representatives of the academic community or private sector, researchers and captive managers) to evaluate threat status of all taxa in a broad taxonomic group (e.g., penguins), geographical region or country (e.g., Costa Rica). Conway (1995) stated that "The CAMP's proven heuristic value and constant refinement and expansion have made it one of the most imaginative and productive organising forces for species conservation today."

Information gathering is focused on the most recent available data, estimates, informed guesses and identification of needed knowledge that allow:

1. assignment to IUCN Category of Threat;
2. broad-based management recommendations;
3. specific conservation-oriented research recommendations useful to generate the knowledge needed to develop more comprehensive management and recovery programs *in situ* and/or *ex situ*.

Workshop participants make all decisions and recommendations. CBSG's role is to facilitate organised discussion and, if necessary, provide access to expert advice. Since the program's inception in 1991, more than 70 CAMP

processes have been undertaken. The CAMP continues to evolve as a result of dynamic discussions at each workshop and from input received from wildlife experts worldwide. Many of the changes in format and assessments reflect CBSG's interest in responding to the concerns and needs expressed by its constituents. Although the majority of CAMPs have focused on vertebrates, the process' evolution has facilitated its successful application to invertebrates and plants (e.g., partula snails, endemic invertebrates of St. Helena Island, endemic orchids of Costa Rica, Indian medicinal plants)..

New Directions for CAMPs

As the review of major vertebrate groups nears completion, the CAMP process is changing from being a taxon-based approach to focus on a wider range of regionally endemic taxa. A number of regional CAMPs have been held: cactus of the Tehuacán-Cuicatlán Valley in Mexico, selected Costa Rican endemic vertebrates and butterflies; endemic orchids of Costa Rica; Hawaiian forest birds; endemic birds of Panama; Mexican primates; South American felids; Mexican felids; and endemic mammals of Panama. This approach to the CAMP process, conducted in the region, takes advantage of the broad base of information held in the experience of local biologists and managers. The information also is more readily formulated on a habitat and ecosystem basis with more explicit identification and assessment of threats and needed research and management activities. One significant by-product of the regional CAMP is increased communication and networking among local conservationists, frequently people with similar overall goals but rarely the opportunity to meet or interact.

The value of the CAMP as a rapid assessment tool has been demonstrated intensively in India and Costa Rica, as well as other countries. India is finding the CAMP process valuable in developing its national biodiversity strategy. In India, the USAID Biodiversity Support Program, the Nature Conservancy and the World Resources Union have developed the Biodiversity Conservation Prioritisation Project (BCPP). The World Wide Fund for Nature (WWF) and the BCPP selected the IUCN Red List criteria as the best current method to prioritise species and the CAMP process as the best methodology to carry out the exercise in an objective, efficient and participatory manner. The Zoo Outreach Organisation and CBSG India, the Indian regional network of the CBSG, were asked to organised and facilitate CAMP workshops for species prioritisation covering a great deal of the biodiversity of India. To date, as part of the BCPP, CAMPs have been carried out for soil invertebrates, corals, freshwater fish, amphibians, reptile, mammals, medicinal plants and mangrove ecosystems, with more workshops planned.

CAMPs also have been recommended as the first step in developing Action Plans by Specialist Groups within the SSC and BirdLife International. This process has laid the foundation for Action Plans for hornbills (Worth & Sheppard, in prep), Galliformes (Dekker et al. 1995; McGowan et al. 1995; Garson & McGowan, in press) and Procyonids (Glatston 1994).

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Conservation Assessment Management Plan
Taxon Data Sheet for _____

Working Group: **Date:**

PART ONE

1. Scientific Name (With authority and date):

_____

_____

1A. Synonyms

_____

_____

1B. Family:

_____

1C. Common name(s) with language:

_____

_____

1D. Taxonomic level of assessment: Species Sub species Variety Form

2. Distribution of the taxon

2A. Habit or life form (only plants):

_____

2B. Habitat of the taxon:

_____

_____

2C. Habitat specificity (niche, elevation, etc.):

_____

_____

2D. Historical distribution (Global -- in past 100 years described by country):

_____

_____

2E. Current distribution (listed by country):

_____

_____

2F. Current regional distribution (country/ biogeographic region of assessment):

_____

_____

2G. Concentrated migration regions:

_____

3. Approximate **EXTENT OF OCCURRENCE** of the taxon in and around the area of study/ sighting/ collection (Extent of occurrence is defined as the area contained within the shortest continuous imaginary

boundary encompassing all known, inferred or projected sites of present occurrence of the taxon): (tick appropriate box)

< 100 km^2 101 - 5,000 km^2 5,001 - 20,000 km^2 > 20,001 km^2

4. Approximate **AREA OF OCCUPANCY** of the taxon in and around the area of study/ sighting/ collection (Area of occupancy is defined as the area occupied by the taxon within the 'extent of occurrence'): (tick appropriate box)

< 10 km^2 11 - 500 km^2 501 - 2,000 km^2 > 2,001 km^2

5. Number of Locations or Subpopulations in which the taxon is distributed: _____

5A. Are the locations or populations: Contiguous Fragmented Not known

6. Habitat status:

6A. Is there any change in the habitat where the taxon occurs: Yes No If yes, Is it a:

Decrease in area Increase in area Stable in area Unknown

6B. If Decreasing, what has been the decrease in habitat (approximately, in percent) over years?:

< 20% > 20% > 50% > 80% in the last _____ years

6C. If Stable or Unknown, do you predict a decline in habitat (approximately, in percent) over years?:

< 20% > 20% > 50% > 80% in the next _____ years

6D. State primary cause of change: _____

6E Is there any change in the quality of habitat where the taxon occurs: Yes No If yes,

Decrease in quality Increase in quality Stable in quality Unknown

6F. State primary cause of change: _____

7. Threats:

7A. What are the threats to the taxon? (Circle **present [P]** or **future (predicted) [F]** threats below):

Human interference [P] [F]
Aircraft [P] [F]
Artificial lighting [P] [F]
Damming [P] [F]
Destructive fishing [P] [F]
Fishing [P] [F]
Grazing [P] [F]
Harvest/ Hunting [P] [F]
Harvest for medicine [P] [F]
Harvest for food [P] [F]
Harvest for timber [P] [F]
Loss of habitat [P] [F]
Habitat fragmentation [P] [F]
Habitat loss due to exotic animals [P] [F]
Habitat loss due to exotic plants [P][F]
Overexploitation [P] [F]
Pesticides [P] [F]
Poisoning [P] [F]
Other threats (please specify):

Pollution [P] [F]
Powerlines [P] [F]
Road kills [P] [F]
Trade for market or medicine [P] [F]
Trade of parts [P] [F]
Trampling [P] [F]
War [P] [F]

Natural/ Man induced threats [P] [F]
Climate [P] [F]
Disease [P] [F]
Decline in prey species [P] [F]
Drowning [P] [F]
Edaphic changes [P] [F]
Genetic problems [P] [F]
Hybridization [P] [F]
Interspecific competition [P] [F]
Interspecific competition from exotics [P] [F]
_____

Interspecific competition -livestock [P] [F]
Nutritional disorders [P] [F]
Predation [P] [F]
Predation by exotics [P] [F]
Siltation [P] [F]

Catastrophes [P] [F]
Drought [P] [F]
El Nino [P] [F]
Fire [P] [F]
Hurricane [P] [F]
Landslide [P] [F]
Tsunami [P] [F]
Volcano [P] [F]

7B. Are these threats resulting in (perceived or inferred) or may result in (predicted) population decline?:
Yes No

8. Trade:

8A. Is the taxon in trade?: Yes No If yes, is it

Local Domestic Commercial International

8B. Parts in trade:
Skin Bones Fur
Hair Horn Organs Glands
Meat Taxidermy models Live animal Products
Others, please specify

_____

8C. Which form of trade (specified form) is resulting in a perceived or inferred population decline?:

_____

_____

9. Population numbers:

9A. Global population: _____

9B. Regional population (No. of sub populations): _____

9C. Number of **Mature Individuals** (in all populations): < 50 < 250 < 2,500 > 2,500

9D. Generation time (Defined here as the average age of parents in population):_____

10. Population trends:

10A. Is the population size/ numbers of the taxon:
Declining Increasing Stable Unknown

10B. If Declining, what has been the rate of population decline perceived or inferred:
< 20% > 20% > 50% > 80% in the last _____ years/ generations

10C. If Stable or Unknown, do you predict a future decline in the population. Yes No
If yes, please specify rate and factors e.g. habitat loss, threats, trade, etc._____

< 20% > 20% > 50% > 80% in the next _____ years/ generations

11. Data Quality:

11A. Are the above estimates based on:
Census or monitoring General field study Informal field sighting Literature
Indirect information such as from trade, etc. Museum/ records Hearsay/ popular belief

12. Recent field studies (in the last 10 years). Indicate year of study not year of publication.

Researcher names Location Dates Topics

_____

_____

_____

_____

_____

_____

_____

_____

PART TWO

13. Status:

13A. IUCN: _____ IUCN Criteria based on: _____

13B. CITES: _____

13C. National Wildlife Legislation: _____

13D. National Red Data Book: _____

13E. International Red Data Book: _____

13F. Other legislation (please specify): _____

13G. Known presence in protected areas (please list): _____

13H. National or regionally endorsed protection plan: _____

PART THREE

14. Supporting Research recommended for the taxon: Yes No If yes, is it

Survey Genetic research Taxonomic research Life history studies
Others (taxon specific)_____

14A. Is Population and Habitat Viability Assessment recommended: Yes No Pending

15. Management recommendations for the taxon:

Habitat management Wild population management Monitoring Translocation
Sustainable utilization Public awareness Genome Resource Banking
Limiting factor management Captive breeding Work in local communities
Address policy makers ref needs of local people
Others_____

16. If **Captive Breeding/Cultivation** is recommended, is it for:
Species recovery Education Reintroduction Benign introduction
Research Husbandry Preservation of live genome

17. Do **Captive stocks** already exist: Yes No If yes,

17A. Names of facilities:_____
_____

17B. Number in captivity: Male _____ Female _____ Unsexed _____ Total _____ Not known

17C. Does a coordinated **Species Management Program** exist for this species : Yes No
If yes, which countries (if country, which institutions):_____
_____

17D. Is a coordinated **Species Management Program** recommended for the range country(ies) ?
Yes No (please specify countries) _____

18. Level of captive breeding/cultivation recommended:

A. Ongoing captive program intensified or increased
B. Ongoing captive program decreased
C. Initiate captive program within 3 years
D. Initiate captive program in 3 years

19. Are techniques established to propagate the taxon:

Techniques known for this taxon or similar taxon Some techniques known for taxon or similar taxa
Techniques not known at all Information not available with this group of compilers

20. Other comments: _____
_____
_____
_____

PART FOUR

21. Sources: _____
_____
_____
_____

22. Compilers: _____
_____
_____

APPENDIX II.

TAXON DATA SHEET: ORGANIZATION AND DEFINITIONS

The Conservation Assessment and Management Plan (CAMP) **Taxon Data Sheet** is a working document for recording information that can be used to assess and categorize the degree of threat to a taxon using the IUCN Red List Criteria and recommend conservation action. This sheet has four parts.

- **Part one (numbers 1 -12)** summarizes taxonomic and biological information on the taxon and asks for information on population, distribution, demography, habitat, threats.

- **Part two (number 13)** provides space for the conservation status as derived from information in 1 - 12, as well as for earlier categorizations according to IUCN, regional, national, and legal criteria.

- **Part three (numbers 14 -19)** requests suggesting suitable steps for management of the taxon, both in the wild and in captivity.

- **Part four (numbers 20 -22)** are for information sources, both published and unpublished, and the names of the compilers or contributors to the completed Taxon Data Sheet.

The completed Taxon Data Sheets for different groups of organisms will differ slightly. A major advantage of the revised IUCN Red List Categories is that they are applicable across all taxon groups. The IUCN Red List Categories are described in Appendix III of this document.

The CAMP Taxon Data Sheet is keyed to the IUCN Red List Criteria. The Taxon Data Sheet has been made more "user-friendly" so that participants can tick boxes instead writing in much of the sheet. It is also more "data friendly" to accommodate the computerized data entry program. This sheet asks for information from which the conservation status of the taxon in the wild can be derived. The information can also be used for making research and management recommendations.

DEFINITIONS OF TERMS USED IN THE TAXON DATA SHEET

This section of the CAMP Reference Manual defines precisely what data are included in each Part of the Taxon Data Sheet and also links the Taxon Data Sheet directly with the IUCN Guidelines to the Red List categories (see Appendix III). If complete information is not available for any species, details can be added to the sheets after the workshop when the Draft Report is circulated for review. Participants should make a note of incomplete taxa so information can be added later.

PART ONE

1. Scientific name (with authority and date): Scientific names of extant taxa -- genus and species (or subspecies where appropriate). The name should be followed by the authority (author's) name and date of description.

1A. Synonyms: List scientific synonyms and ambiguities with authority.

1B. Family: List the family to which the Taxon belongs. In the case of invertebrates, the Order and Sub-order may be listed.

1C. Common name(s) with language: List known common names in English, and vernacular names followed by the language in parenthesis.

1D. Taxonomic level: This indicates the taxonomic level of assessment (e.g., species or subspecies). Taxonomic uncertainties may be discussed in this section. Subspecies not considered separately should be listed here along with their distribution.

2. Distribution of the taxon

2A. Habit or Life form: List habit or life form of the taxon (plants only).

2B. Habitat: Indicate the habitat in which the taxon resides. Standard national classification of vegetation types may be used as guidelines.

2C. Habitat specificity: Indicate the specific niche or microhabitat of the taxon. Elevation or altitude range should be mentioned.

2D. Historical distribution: Record the historical global distribution of the taxon in the past 100 years (by country).

2E. Current distribution: Note the current geographic extent, including breeding and wintering locations of the taxon.

2F. Current regional distribution: Record the geographic distribution of the taxon in the region being covered in the current exercise (national, regional, political, etc.).

2G. Concentrated migration regions: If applicable, list the regions in which migration is concentrated, especially those in which the taxon may face some degree of threat.

3. Extent of occurrence: If possible, list the actual size of the area in which the taxon occurs. Also list the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred, or projected sites of present occurrence of a taxon, excluding cases of vagrancy (see Figure 1 below). This measure does not take account of discontinuities or disjunction in the spatial distribution of taxa. Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

The Extent of Occurrence is one criterion under which a taxon can qualify for one of the IUCN Red List categories of Threat. If the Extent of Occurrence is:

- less than 100 km^2 see **"criteria B" for CR**
- less than 5,000 km^2 see **"criteria B" for EN**
- less than 20,000 km^2 see **"criteria B" for VU**
- more than 20,000 km^2 see **Area of Occupancy** described below :

4. Area of occupancy: List the area within the 'extent of occurrence' which is actually occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of a taxon (e.g., colonial nesting sites, feeding sites for migratory taxa). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon. The criteria include values in km^2, and thus to avoid errors in classification the area of occupancy should be measured on grid squares or equivalents which are sufficiently small (see Fig. 1).

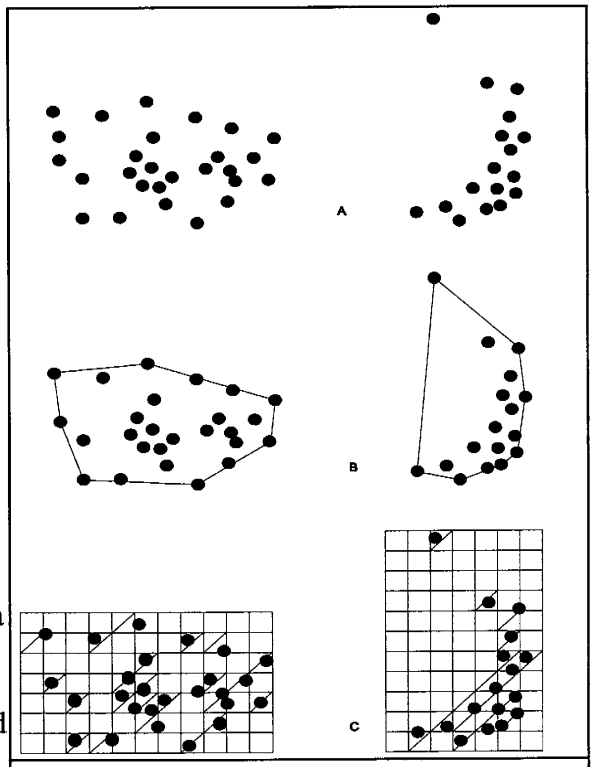


Figure 1: Two examples of the distinction between extent of occurrence and area of occupancy. (a) is the spatial distribution of known, inferred or projected sites of occurrence. (b) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary. (c) shows one measure of area of occupancy which can be measured by the sum of the occupied grid squares.

The Area of Occupancy is one criterion under which a taxon can qualify for one of the IUCN Red List categories of Threat. If the Area of Occupancy is

- less than 10 km^2, see **"Criteria B" for CR**
- less than 500 km^2, see **"Criteria B" for EN**
- less than 2,000 km^2, see **"Criteria B" for VU**

If Extent of Occurrence and Area of Occupancy are not limited to less than 20,000 km^2 and 2,000 km^2 respectively, the criteria for threat due to restricted distribution does not apply.

5. Number of Locations: Note the number of locations or sub-populations. Indicate whether or not the locations are severely fragmented.

6. Habitat status:

6A. Indicate the status of the habitat in which the taxon occurs.

6B. If there is a change in habitat, indicate change as percent over the last number of years.

6C. If the status has not changed, indicate a percent of change if your predict so in the future.

6D. State the primary cause of change either in the past or in the future.

6E. Indicate the status of the **quality of habitat** in which the taxon is distributed.

6F. If there is a change in the status of quality of habitat, indicate primary cause for the change.

7. Threats: Identify present or predicted future events that are threats to the taxon. Circle the choice in 7A and indicate in 7B if there is any population decline due to any or all of these threats.

7A.

Human interference
Aircraft
Artificial lighting
Damming
Destructive fishing
Fishing
Grazing
Harvest/Hunting
Harvest for medicine
Harvest for food
Harvest for timber
Loss of habitat
Habitat fragmentation
Habitat loss due to exotic animals
Pollution
Powerlines
Road kills
Trade for market or medicine
Trade of parts
Trampling
War

Natural/Man induced threats
Climate
Disease
Decline in prey
Drowning
Interspecific competition – livestock
Nutritional disordes
Predation
Predation by exotics
Siltation

Catastrophes
Drought
El Nino
Fire
Hurricane
Landslide
Tsunami
Edaphic factors (due to fertilizers, pesticides, fire)

Others (please specify)

8. Trade: Is the taxon in trade? If so, indicate the level of trade in 8A, parts in trade in 8B and its effect on the population in 8C.

9. Population numbers:

9A. Global population: List the estimated numbers of pairs in the wild. If specific numbers are unavailable, estimate the general range of the population size.

9B. Regional populations: List the estimated number of pairs in any particular region for which there are data, followed by the location.

9C. Number of mature individuals: Indicate the number of mature individuals in the entire population.

9D. Generation time: Indicate the number of years in a generation. A generation is defined as the average age of parents in the population.

10. Population trends - % change in years or in generations: If possible, list the trend of the population (stable, declining, or increasing) in 10A, 10B and 10C

11. Data Quality: List the actual age of the data used to provide 'population estimate'. Also list the type of data from which the estimates are provided.

Reliable census or population monitoring
General field study
Informal field sightings
Indirect information (trade numbers, habitat availability).
Museum/ herbarium studies/ records
Literature
Hearsay/popular belief

Record a combination if there is inconsistent data quality in different parts of range.

12. Recent field studies: List any current or recent field studies (in the last 10 years), the name of the researcher and the location of the study. Quote only study dates. Do not quote

publication dates (publications form these studies can be listed in the 'Sources' section of the Taxon Data Sheet).

PART TWO

13. Conservation status: With the above information and using the criteria and guidelines in Section III, derive a status according to the IUCN Red List categories. Also indicate the criteria that the treat category is based on. This is explained in full in Appendix III.

EX	=	Extinct	
EW	=	Extinct in the wild	
CR	=	**Critically Endangered**	**Threatened categories**
EN	=	**Endangered**	
VU	=	**Vulnerable**	
LR	=	Lower Risk	
cd	=	Conservation Dependent	
nt	=	Near Threatened	
lc	=	Least Concern	
DD	=	Data Deficient	
NE	=	Not Evaluated	

Conservation status based on: Indicate which of the IUCN Red List criteria in the IUCN Red List Categories document, Appendix III) were used to assign a category of threat. Be sure to list every specific criterion that applies (for example, A1b, B3c, E):

PR	=	Population reduction (A1a, or A2b, etc.)
RD	=	Restricted distribution (B1, or B2a, B3c, etc.)
PE	=	Population estimates (C1, or C2a, etc.)
NM	=	Number of mature individuals (D)
PX	=	Probability of extinction (E)

CITES and other legislation: List CITES Appendix on which the species is listed, if appropriate.
List the status of the taxon if included in any other national or international legislation or Red Data Book

Other: List whether the species has been assigned threatened status in other venues, e.g., nationally or in other conservation assessments.

Known presence in protected areas: Please list all the protected areas in which the taxon is found.

Nationally or regionally endorsed protection plans: Indicate if the taxon is under any kind of protection either nationally or locally.

PART THREE

14. Research recommendations: Based on the threats to the taxa and lacunae areas of study, research recommendations form a part of species recovery program. Indicate the areas of research needed to understand the taxon. The categories within this section are:

Survey
Genetic research/studies
Taxonomic research/studies
Limiting factor research
Life history studies
Epidemiological studies
Husbandry research
Trade
Other (record in detail on Taxon Data Sheet)

14A. Note whether a **Population and Habitat Viability Assessment** is recommended for the taxon.

15. Management recommendations: It should be noted that there is (or should be) a clear relationship between threats and subsequent outlined research management actions. The "Management recommendations" column provides an integrated view of actions to be taken, based on the listed threats. Adaptive management recommendations can be defined as a management program which includes a strong feedback between management activities and an evaluation of the efficacy of the management, as well as response of the species to that activity. The categories within the column are as follows:

Habitat management
Translocations
Monitoring
Wild population management
Limiting factor management
Public awareness/education
Sustainable utilization
Genome research banking
Captive breeding/cultivation
Work with local communities
Other (record in detail on Taxon Data Sheet)

16. Captive breeding/cultivation recommendation: If captive breeding/cultivation is recommended in section 15, indicate whether this program is required for any particular reason such as:

Species recovery
Education

Reintroduction/translocation
Benign introduction
Research
Husbandry
Preservation of live genome
Others

17. Captive/cultivated stocks: Indicate if there are any captive or cultivated stocks of the taxon. If so list the facilities in 17A, and the number in captivity in 17B. In cases where there is a captive breeding/cultivation program list the facilities it is located in. If not, indicate if a species management program is exists in 17C or if such a program is recommended in 17D.

18. Captive breeding/cultivation recommendation: If captive breeding/cultivation is recommended, indicate the action to be taken from among these:

Ongoing captive breeding/ cultivation program intensified or increased
Ongoing captive breeding/ cultivation program decreased
Initiate captive breeding/ cultivation program within three years
Initiate captive breeding/ cultivation program after three years
No captive breeding/ cultivation required for the taxon.

19. Are techniques established for propagating the taxon in captivity/cultivation: Indicate the appropriate choice:

Techniques available or in place for breeding/ cultivating the taxon or similar taxa *ex situ*
Techniques partially known or in place for breeding/ cultivating the taxon or similar taxa *ex situ*
Techniques not known for breeding/ cultivating taxon or similar taxa *ex situ*
Information not available about breeding/ cultivating techniques for the taxon among the group of compilers

20. Other Comments: Note any additional information that is important with respect to the conservation of the taxon.

21. Sources: List sources used for information for the above data. (Author name, year, title of article or book, journal, issue, and page numbers).

22. Compilers: List the names of the people who contributed information for this Taxon Data Sheet (including people who sent Biological Information Sheets, if they were used.).

Conservation Assessment and Management Plan (CAMP)

Taxon Data Sheet Management Information System

Conservation Assessment and Management Plans (CAMPs) provide strategic guidance for assessing priorities for intensive management, sometimes including captive breeding, within the context of the broader conservation needs of threatened taxa. CBSG has conducted over 40 CAMP workshops assessing more than 5000 taxa.

The CAMP Process brings together a broad spectrum of experts and stakeholders to:

a. evaluate the current status of populations and habitats in the wild;
b. evaluate the current status of populations in captivity;
c. assess degree of threat using IUCN Red List criteria;
d. make recommendations for intensive management action; and
e. make recommendations for specific conservation-oriented research.

During the CAMP workshop, participants use a taxon data sheet to systematically record data on the current status of populations and habitats in the wild, threats and recommendations for intensive action. The Taxon Data Sheets provide documentation of reasoning behind IUCN Red List categories of threat and recommended management and research. In the past, workshop participants entered data into a taxon data sheet in a word processing program and the data were tabulated and summarized manually. This process was extremely time consuming and the analysis of the data was minimal. In addition, although valuable data are contained in CAMP reports for a wide spectrum of taxa, this information is available only in hard copy documents and is not readily accessible.

CBSG has addressed these problems with the development of the CAMP Taxon Data Sheet Management Information System. The application operates within Microsoft Access 97, part of Microsoft's Office 97 Professional Suite of programs, and is extremely user friendly. Data are entered on a series of nine pages (tabs on each page are numbered to correspond with item numbers on the paper copies of taxon data sheets), which include:

- Scientific and common names, and notes on the taxonomy of the species
- Distribution of the species, both current and historical
- Threats to the species: human interference, natural and induced, and catastrophic threats
- Parts in trade
- Population data
- Studies and status
- Management and research recommendations
- Ex situ recommendations
- Sources and compilers of the data sheet

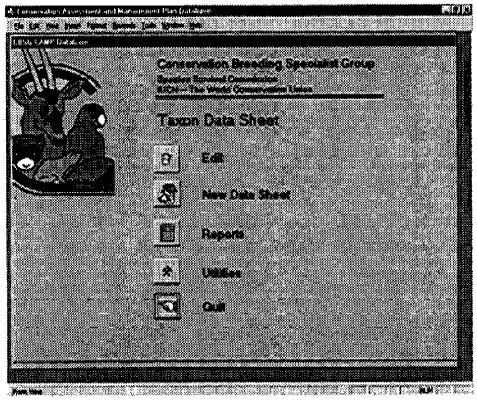
Once the data are entered at a CAMP workshop they are merged with the master database, updates of which will be regularly distributed to all ISIS institutions via the REGASP program.

The advantages of this computerized database system include the fact that the program is both specific and flexible. This allows for a wide variety of detailed information to not only be entered but to be searched on and retrieved in response to specific queries. The computer program also facilitates the rapid and accurate production of CAMP reports. Most importantly, it links CAMP information to global systems such as REGASP thereby allowing easy access to CAMP information by the zoo community.

Potential users of the CAMP database include CAMP workshop participants, the zoo community, those working to refine existing data and data estimates, researchers and scientists.
Zoos and funding agencies looking for guidance regarding specific projects needing support may also find this database useful. The dissemination of CAMP information to all these users will not only serve their particular needs and raise the profile of CBSG but may also result in the increased implementation of CAMP workshop recommendations.

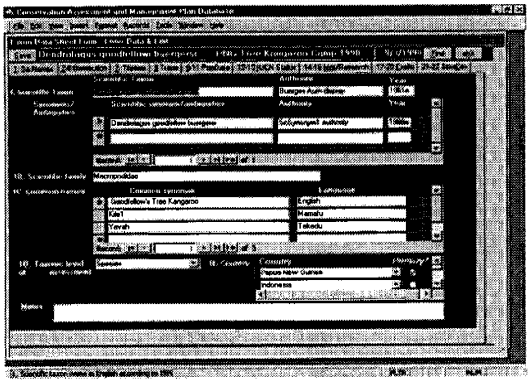
It is CBSG's intention that the CAMP Process will ultimately contribute to the wise use, worldwide, of limited resources for species conservation. The Taxon Data Sheet Management Information System database will assist

both *in situ* and *ex situ* managers with priority setting and decision-making in regard to collection planning and resource allocation.

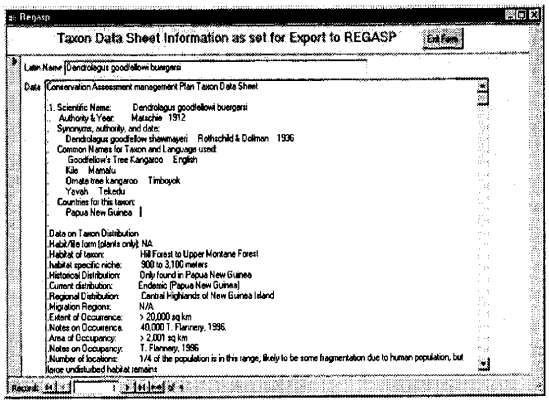


"Constant refinement and expansion have made the CAMP Process one of the most imaginative and productive organizing forces for species conservation today." (Conway, 1995).

CAMP DATA ENTRY



CAMP Data May Be Accessed Using ARAZPA'S REGASP



Conservation Breeding Specialist Group

Species Survival Commission
IUCN -- The World Conservation Union

U.S. Seal, CBSG Chairman

Input Data Required for VORTEX

1) **Do you want to incorporate inbreeding depression?** Yes or No _____
Yes, if you think inbreeding might cause a reduction in fertility or survival
No, if you think inbreeding would not cause any negative impact

If you answered "Yes" to Question 1), then we need to specify the severity of the impacts of inbreeding by answering the following two questions:

1A) **How many lethal equivalents exist in your population?** _____
"Lethal equivalents" is a measure of the severity of effects of inbreeding on juvenile survival. The median value reported by Ralls et al. (1988) for 40 mammal populations was 3.14. The range for mammals reported in the literature is from 0.0 (no effect of inbreeding on survival) to about 15 (most inbred progeny die).

1B) **What proportion of the total lethal equivalents is due to recessive lethal alleles?** _____
This question relates to how easily natural selection would remove deleterious genes if inbreeding persisted for many generations (and the population did not become extinct). In other words, how well does the population adapt to inbreeding? The question is really asking this: what fraction of the genes responsible for inbreeding depression would be removed by selection over many generations? Unfortunately, little data exist for mammals regarding this question; data on fruit flies and rodents, however, suggest that about 50% of the total suite of inbreeding effects are, on average, due to lethal alleles.

2) **Do you want environmental variation in reproduction to be correlated with environmental variation in survival?** Yes or No _____
Answering "Yes" would indicate that good years for breeding are also good years for survival, and bad years for breeding are also bad years for survival. "No" would indicate that annual fluctuations in breeding and survival are independent.

3) Breeding system: Monogamous or Polygynous? _____

4) At what age do females begin breeding? _____

5) At what age do males begin breeding? _____
For each sex, we need to specify the age at which the typical animal produces its first litter. The age at which they "begin breeding" refers to their age when the offspring are actually born, and not when the parents mate.

6) Maximum age? _____

When do they become reproductively senescent? VORTEX will allow them to breed (if they happen to live this long) up to this maximum age.

7) What is the sex ratio of offspring at birth? _____
What proportion of the year's offspring are males?

8) What is the maximum litter size? _____

9) In the average year, what proportion of adult females produce a litter? _____

10) How much does the proportion of females that breed vary across years?
Ideally, we need this value specified as a standard deviation (SD) of the proportion breeding. If long-term quantitative data are lacking, we can estimate this variation in several ways. At the simplest intuitive level, in about 67% of the years the proportion of adult females breeding would fall within 1 SD of the mean, so (mean value) + SD might represent the breeding rate in a typically "good" year, and (mean value) – SD might be the breeding rate in a typically "bad" year.

11) Of litters that are born in a given year, what percentage have litters of ...
1 offspring? _____
2 offspring? _____
3 offspring? _____
4 offspring? _____
(and so on to the maximum litter size).

12) What is the percent survival of females ...
from birth to 1 year of age? _____
from age 1 to age 2? _____
from age 2 to age 3? _____ (no need to answer this if they begin breeding at age 2)
from age x to age x+1, for adults? _____

13) What is the percent survival of males ...
from birth to 1 year of age? _____
from age 1 to age 2? _____
from age 2 to age 3? _____ (no need to answer this if they begin breeding at age 2)
from age x to age x+1, for adults? _____

14) For each of the survival rates listed above, enter the variation across years as a standard deviation:
For females, what is the standard deviation in the survival rate
from birth to 1 year of age? _____
from age 1 to age 2? _____
from age 2 to age 3? _____ (no need to answer this if they begin breeding at age 2)
from age x to age x+1, for adults? _____

For males, what is the standard deviation in the survival rated
from birth to 1 year of age? _____
from age 1 to age 2? _____
from age 2 to age 3? _____ (no need to answer this if they begin breeding at age 2)
from age x to age x+1, for adults? _____

15) How many types of catastrophes should be included in the models? _____

You can model disease epidemics, or any other type of disaster, which might kill many individuals or cause major breeding failure in sporadic years.

16) For each type of catastrophe considered in Question 15),
What is the probability of occurrence? _____
(i.e., how often does the catastrophe occur in a given time period, say, 100 years?)
What is the reproductive rate in a catastrophe year relative to reproduction in normal years? _____
(i.e., 1.00 = no reduction in breeding; 0.75 = 25% reduction; 0.00 = no breeding)
What is the survival rate in a catastrophe year relative to survival in normal years? _____
(i.e., 1.00 = no reduction in breeding; 0.75 = 25% reduction; 0.00 = no breeding)

17) Are all adult males in the "pool" of potential breeders each year? Yes or No _____
(Are there some males that are excluded from the group of available breeders because they are socially prevented from holding territories, are sterile, or otherwise prevented from having access to mates?)

18) If you answered "No" to Question 17), then answer at least one of the following:
What percentage of adult males is available for breeding each year? _____
or
What percentage of adult males typically sires a litter each year? _____
or
How many litters are sired by the average breeding male (of those that sired at least one litter)? _____

19) What is the current population size? _____
(We will assume that the population starts at a "stable age distribution", rather than specifying ages of individual animals in the current population.)

20) What is the habitat carrying capacity? _____
(How many animals could be supported in the existing habitat?)
(We will assume that the habitat is not fluctuating randomly in quality over time.)

21) Will habitat be lost or gained over time? Yes or No _____
If you answered Yes to Question 21), then ...

22) Over how many years will habitat be lost or gained? _____

23) What percentage of habitat will be lost or gained each year? _____

24) Will animals be removed from the wild population (to bolster captive stocks or for other reasons) ?
Yes or No _____
If "Yes", then,
At what annual interval? _____
For how many years? _____
How many female juveniles? _____ 1-2 year old females? _____ 2-3 year old females? _____ adult females? _____ will be removed each time.
How many male juveniles? _____ 1-2 year old males? _____ 2-3 year old males? _____ adult males? _____ will be removed each time.

25) Will animals be added to the population (from captive stocks, etc.)? Yes or No _____
If "Yes", then,
At what annual interval? _____

For how many years? _____
How many female juveniles? _____ 1-2 year old females? _____ 2-3 year old females? _____ adult females? _____ will be removed each time.
How many male juveniles? _____ 1-2 year old males? _____ 2-3 year old males? _____ adult males? _____ will be removed each time

Note: VORTEX has the capability to model even more complex demographic rates, if a user thinks that greater specificity is needed. For example, breeding or survival rates could be specified as functions of age. Contact Philip Miller, Program Officer with CBSG if you would like to learn more about this additional flexibility.

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP)
FOR
ARABIAN CARNIVORES
&
POPULATION AND HABITAT VIABILITY ASSESSMENT (PHVA)
FOR THE
ARABIAN LEOPARD AND TAHR

SECTION 8

List of Participants

Carnivores of Arabia & the Arabian Tahr

CAMP Participants

KINGDOM OF SAUDI ARABIA

Saud. M. ANAJARIYYA
Wildlife Veterinarian
National Wildlife Research Centre
P.O. Box 1086
Taif, Saudi Arabia
Tel: +966-2-7455-188; 2-7455-196
Fax: +966-2-7455-176
E-mail: desert@nwrc-sa.org

ABDUL RAHMAN KHOJA
Administrative Director
National Wildlife Research Centre
P.O. Box 1086
Taif, Saudi Arabia
Tel: +966-2-7455-188; 2-7455-196
Fax: +966-2-7455-176
E-mail: desert@nwrc-sa.org

DR. IYAD A. NADER
Director
King Khalid Wildlife Research Centre
P.O. Box 61681
Riyadh 11575
Saudi Arabia
Tel: +966-1-404-2527
Fax: +966-1-401-1527
Private: P.O. Box 2491
Riyadh 11575
Tel: +966-1-269-3028
Fax: +966-1-269-3028

PATRICK PAILLAT
Director
National Wildlife Research Centre
P.O. Box 1086
Taif, Saudi Arabia
Tel: +966-2-7455-188; 2-7455-196
Fax: +966-2-7455-176
E-mail: desert@nwrc-sa.org

DR. PHILIP SEDDON
Research Coordinator
National Wildlife Research Centre
P.O. Box 1086
Taif, Saudi Arabia
Tel: +966-2-7455-188; 2-7455-196
Fax: +966-2-7455-176
E-mail: pseddon@nwrc-sa.org

REPUBLIC OF YEMEN

Dr. Ali Mohammed ALBAR
Associate Professor
Sana'a University
P.O. Box 12191
Sana'a, Republic of Yemen
Fax: +967-45564
E-mail: albaraloo@hotmail.com

DR. HUSSIEN ALAWI AL-GUNIED
Secretary General
Environment Protection Council
Saa'a, Republic of Yemen
Tel: +967-1-257-569
Fax: +967-1-257-549
E-mail: E.P.C.@y.net.ye

SADIK YAHIA AL-OSIME
Bio. Specialist
Environment Protection Council
Saa'a, Republic of Yemen
Tel: +967-1-257-573 (-257-572)
Fax: +967-1-257-548
E-mail:

SULTANATE OF OMAN

Dr. Ayoub bin Rajab AL-BULUSHI
Director of Veterinary Services
Diwan of Royal Court
P.O. Box 412
Postal Code 111
Sultanate of Oman
Tel: +968-624-111 (-620-322)
Fax: +968-622-509

DR. ABDULQADER AWADH ALAWI IBRAHIM
Veterinary Officer
Diwan of Royal Court
P.O. Box 787
Postal Code 211
Sultanate of Oman
Tel: +968-235-070
Fax: +968-235-009

DR. SALIM ABDULLAH BAHWAN
Veterinary Officer
Diwan of Royal Court
P.O. Box 64
Postal Code 111
Sultanate of Oman
Tel: +968-620-322
Fax: +968-622-509

ANDREW SPALTON
Expert Field Studies/Wildlife Management
Diwan of Royal Court
P.O. Box 246
Muscat 113, Oman
Tel: +968-736-482
Fax: +968-740-550
E-mail: acedrc@omantel.net.om

RICHARD JOHN WOOD
Manager of the Omani Mammal Breeding Centre
Diwan of Royal Court of Oman
P.O. Box 64, Seeb Airport
Postal Code 111
Sultanate of Oman
Tel: +968-620-322;
+968-550-220 (office);
+968-620-278

BAHRAIN

Mubarak Ali AL DOSARI
Curator of Mammals
Al Areen Wildlife Park
P.O. Box 28690
Riffa, Bahrain
Tel: +973-836-116
Fax: +973-836-117

UNITED ARAB EMIRATES

Abu Dhabi:

Dr. Amrita G. DE SOY
Head of Terrestrial Environmental Research Center
Environmental Research & Wildlife Development Agency
P.O. Box 45553
Abu Dhabi, United Arab Emirates
Tel: +971-050-446-0907
Fax: +971-2-441-4131
E-mail: ads@erwda.gov.ae

CHRISTOPHER DREW
Wildlife Researcher
Environmental Research & Wildlife Development Agency
P.O. Box 45553
Abu Dhabi, United Arab Emirates
Tel: +971-2-441-4441;
+971-050-442-8401
Fax: +971-2-441-4131
E-mail: crd1@erwda.gov.ae

DR. FREDERIC LAUNAY
Director
National Avian Research Center
Environment Research And Wildlife Development Agency
P.O. Box 45553
Abu Dhabi
United Arab Emirates
TEL: 971-3-7347-555
FAX: 971-3-7347-607
E-MAIL: **FJL@ERWDA.GOV.AE**

RONALD ANTHONY LOUGHLAND
Principle Environmental Researcher
Emirates Heritage Club
Commission of Environmental Research
P.O. Box 41464
Abu Dhabi, United Arab Emirates
Tel: +971-2-558-4440
Fax: +971-2-558-2224
E-mail: cerehc@emirates.net.ae

Sharjah:

ABDULAZIZ A. AL-MIDFA
Director
Environment & Protected Areas Authority
P.O. Box 101
Sharjah, United Arab Emirates
Tel: +971-653-11999
Fax: +971-653-11419
E-mail: epaa@emirates.net.ae

GHALYA MOHAMMED AL-MIDFA
Environment Section
Environment and Protected Areas Authority
Sharjah, United Arab Emirates
Tel: +971-653-11999

HANA SAIF AL SUWAIDI
Manager
Natural History Museum
Environment and Protected Areas Authority
Sharjah, United Arab Emirates
Tel: +971-050-628-4956
Fax: +971-066-311-000

KEVIN BUDD
Senior Assistant, Mammals Department
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Dr. Florine de Haas van DORSER
Veterinarian
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Jane EDMONDS
Veterinary Nurse
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Christian GROSS
Managing Partner
Animal Management Consultancy
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Robert LLEWELLYN-SMITH
Protected Area & Conservation Specialist
Arabian Leopard Trust
P.O. Box 24444
Sharjah, United Arab Emirates
Tel: +971-7-236-1571
Fax: +971-7-236-1571
E-mail: llsmith@emirates.net.ae

Jackie STRICK
Veterinary Nurse/Head of Laboratory
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Peter PHELAN
Assistant, Mammals Department
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

MICHAEL SMITH
Head of Field Research
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

TEAGUE STUBBINGTON
Assistant, Mammals Department
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

OLIVIA KATHERINE WALTER
Assistant, Mammals Department
Breeding Centre for Endangered Arabian Wildlife, Sharjah
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Peter WRIGHT
Manager, Animal Management Consultancy
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Michelle WRIGHT
Special Projects Manger
Animal Management Consultancy
P.O. Box 1022
Umm Al Quwain, United Arab Emirates
Tel: +971-6-531-1212
Fax: +971-6-531-1156
E-mail: chgross@emirates.net.ae

Dubai:

Gary R. FEULNER
General Counsel
P.O. Box 9342
Dubai, United Arab Emirates
Tel: +971-4-331-3320
Fax: +971-4-331-3371
E-mail: grfeuner@agico.co.ze

Sami A. GARGASH
Head of Veterinary Control Unit
Veterinary Services Section
Public Health Department
Dubai Municipality
P.O. Box 15714
Dubai, United Arab Emirates
Tel: +971-4-286-3366
Fax: +971-4-285-9582
E-mail: awadhi@emirates.net.ae

Dr. Mohammad ALI REZA KHAN
Head of Zoo Section
Dubai Zoo
Public Parks and Horticulture Department
P.O. Box 67
Dubai, United Arab Emirates
Tel: +971-4-344-0462; -344-8283
Fax: +971-4-349-9437
E-mail: mark1147@emirates.net.ae
MAKHAN@dm.gov.ae

Sean MC KEOWN
Collection Manager
H.E. Sheikh Butti Maktoum's Wildlife Centre
P.O. Box 7237
Dubai, United Arab Emirates
Tel: +971-4-337-9097; +971-050-451-7373
Fax: +971-4-337-9097
E-mail: smckeown@emirates.net.ae

Peter MC KINNEY
Veterinary Officer
Wildlife Protection Office
P.O. Box 54049
Dubai, United Arab Emirates

Tel: +971-4-334-4262
E-mail: cyrlab@emirates.net.ae

Declan O'DONOVAN
Manager
Wadi Al Safa Wildlife Centre
P.O. Box 27875
Dubai, United Arab Emirates
Tel: +971-50-659-0777
Fax: +971-4-344-4385
E-mail: cianod@emirates.net.ae

Jaap WENSVOORT
Manager Wildlife
Nakhlee Estate/HCA
P.O. Box 27942
Dubai, United Arab Emirates
Tel: +971-4-396-1130;
+971-50-653-7111
Fax: +971-4-396-1130
E-mail: jwensvoort@hotmail.com

Germany:

Dr. Dieter ERNST
Lecturer, Assoc. Professor
University of Khartoum
Faculty of Science
Department of Zoology
Kieler Str. 148
D-22769, Hamburg
Germany
Tel: +49-40-850-3995
Fax: +49-40-850-3995

Gea OLBRICHT
Curator
Gordon's Wild Cat International Studbook
Hubertusallee 30
D-42117, Wuppertal
Tel: +49-202-744-249
Fax: +49-202-744-249
E-mail: asliwa@t-online.de

Dr. Alexander SLIWA
Curator, Wuppertal Zoo
Hubertusallee 30
D-42117, Wuppertal
Tel: +49-202-747-139 (-744-249)
Fax: +49-202-741-888 (-744-249)
E-mail: asliwa@t-online.de

Switzerland:

Peter JACKSON
Chairman, Cat Specialist Group
Species Survival Commission
World Conservation Union (IUCN)
1172 Bougy
Switzerland
Tel: +41-21-808-6012
Fax: +41-21-808-6012
E-mail: pjackson@iprolink.ch
Website: Lynx.uio.no/catfolk

United Kingdom:

Dr.PaulMUNTON
27 Rylett Road
London, England W12 9SS
Tel: +44-181-743-1777
Fax: +44-181-743-1777
E-mail: munton@globalnet.uk

United States:

Dr. Douglas L. ARMSTRONG
Senior Veterinarian
Center for Conservation & Research
Henry Doorly Zoo
3701 South 10th Street
Omaha, Nebraska 68107-2200 USA
Tel: +1-402-733-8401
Fax: +1-402-733-0490
E-mail: DougA@omahazoo.com

Dr. Naida M. LOSKUTOFF
Reproductive Physiologist
Center for Conservation & Research
Henry Doorly Zoo
3701 South 10th Street
Omaha, Nebraska 68107-2200 USA
Tel: +1-402-733-8401
Fax: +1-402-733-0490
E-mail: NaidaL@omahazoo.com

Dr. Ulysses S. SEAL
Conservation Breeding Specialist Group
SSC-IUCN
12101 Johnny Cake Ridge Road
Apple Valley, Minnesota 55124-8151 USA
Tel: +1-652-997-9800
Fax: +1-612-432-2757
E-mail: office@cbsg.org
Website: www.cbsg.org
Personal E-mail: ulieseal3@aol.com