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Cover: Andean mountain cat *Oreailurus jacobita*
Photo: Jim Sanderson (see page 25)
Editorial
The Numbers Game

“How many are there?” is a FAQ, a frequently asked question when wildlife conservation is discussed. There are few occasions when a straight answer can be given, except “We don’t know”, which is almost always true. All the cats, barring lions and, to a lesser extent, cheetahs, live extremely secretive lives and are seldom seen. But even for lions in their heartland of sub-Saharan Africa there are only wide guestimates about their numbers. Following enquiries addressed to lion specialists, the lion population was put at between 30,000 and 100,000 in the Cat Specialist Group’s Action Plan “Wild Cats”. Five years later, no better estimate/guestimate is available.

Most contentious are tiger population figures, given the world interest in the plight of the great cat. In 1964, E.P. Gee, a British naturalist resident in India, said in his book The Wildlife of India: “I don’t suppose there are more than about 4,000 tigers left in the whole of India today, contrasted with a possible 40,000 fifty years ago”. His guess has since been widely quoted and, as so often happens, been quoted as fact. Later in that decade, J.C. Daniel of the Bombay Natural History Society, and Kailash Sankhala, a forester who was to become the Director of the Project Tiger conservation programme in India, separately collected estimates from forest officials and conservationists throughout the country and came up with a total of 2,500 tigers in India.

After sounding the alarm at the IUCN General Assembly in Delhi in 1969, Sankhala was asked to carry out a preliminary census, which took place in 1972, based, for the first time, on collecting tracings of pugmarks (footprints) in each forest block. He produced a figure of 1,827, but pointed out that some areas could not be surveyed and there could have been some double counting. He summed up by saying that there was “positive information about the presence of only about 1,800 tigers in India”. Nevertheless, the figure of 1,827 continues to be quoted as fact.

Subsequent pugmark censuses in India produced growing totals, reaching a high of 4,334 in 1989, amid growing controversy about the accuracy of the method and alleged exaggeration of the figures in order to show that Project Tiger was a success. In the 1990s, the census results have been lower, with a figure of 3,810 announced at the Millennium Tiger Conference in Delhi in March this year. But published figures for tigers in individual States total only 3,435, and the Director of Project Tiger said last year he believed there were fewer than 3,000, and that poachers were killing more than one tiger a day. India certainly has more tigers than any other country, but, clearly, no one really knows how many.

The situation is worse in most other range countries, where, for various reasons, there has been less effort to produce estimates, and where conditions are often more difficult than in India. One such country is Cambodia, which has suffered from warfare for decades. Now an intensive questionnaire survey has been carried out among hunters (see page 4) which suggests that there could be 500-700 tigers in the country, around three to four times more than officials have said in the past.

Inevitably, scepticism has been expressed, despite the stature of the organizers, for Cambodia is known for a high level of tiger poaching, and the reliability of hunters’ impressions is open to question.

It is to be hoped that the new estimate can be proved to be near the truth. It certainly indicates that Cambodia, long written off, could be one of the most important tiger centres, worthy of greatly increased conservation effort.

Peter Jackson
Guerrilla Groups Disrupting Indian Wildlife Reserves

Manas National Park and Tiger Reserve in northeast India, a World Heritage Site, has been left to the mercy of tribal guerrillas with the withdrawal of staff and paramilitary police, according to an authoritative Indian source.

The source said there was little hope that action could be taken to reassert control before December because of disruption of government work in the run-up to countrywide elections in October and the monsoon, which will shortly break in the area and continue until October, leaving many parts inaccessible because of floods and broken-up dirt roads.

"God knows what will happen", the source declared.

Manas, which extends over 2,840 km² on the border with Bhutan, was estimated to have 80 tigers Panthera t. tigris and 80 great one-horned rhinoceroses Rhinoceros unicornis, as well as one of the last subpopulations of wild buffalo Bubalus arnee and many other endangered species of mammals and birds. But the source said that there had been no sightings of rhinos this year, leading to fears that they had all been poached for their horns, which are used in Chinese traditional medicine. Tigers are also thought to have been poached, as well as deer, which are food for tigers and people.

The Forest and Environment Minister in the central government, Suresh Prabhu, announced recently that an armed police force would be deployed to protect endangered wildlife from poachers and save forests from timber smugglers. He said a special battalion would be deployed in northeastern states, including Assam.

“Our ministry will soon prepare an action plan to find ways to combat poaching and the decrease in the animal habitat,” Prabhu declared. But since then, the government has fallen and no executive decisions are possible until a new government is formed after the October elections.

Manas was invaded in February 1989 by extremists of the All Bodo Students’ Union, the Bodos being a tribal community constituting about one-third of the population of the State of Assam. They are claiming autonomy in their homeland north of the Brahmaputra River, which they say was taken from them during British rule in India. They destroyed 36 or the park’s 58 administrative buildings and killed staff, forcing withdrawal of park management. In recent years, control was reasserted in core areas, and partly opened to tourists, but few went.

The park authorities predicted earlier that if the paramilitaries were withdrawn it would be just a matter of time before the militiants took over the park.

Control has been lost over several more of the 23 tiger reserves, according to the Director of Project Tiger, P.K. Sen. Their forests are ideal hide-outs for insurgents. Most widespread are Maoist guerrillas called Naxalites, named after the district of Naxalbari in Assam, where they first appeared about 40 years ago, fighting for the rights of tribal peoples. Their presence allows poachers and illegal timber traders to operate with impunity, often with the insurgents’ protection.

Illegal felling in Buxa Tiger Reserve

A member of the Cat Specialist Group reports heavy illegal felling in Buxa Tiger Reserve, near West Bengal’s border with Assam. The reserve signboard has been knocked down. Labourers were found cutting massive 100-year-old sal trees (Shorea robusta). It is said that the trees are being felled to supply plywood factories in neighbouring Bhutan. It is also being fashioned into truck bodies so that it can be transported illegally across state boundaries to Delhi, where the bodywork is removed and the chassis driven back for further collections.

The witness saw men drawing handcarts with large pieces of old sal towards the Bhutan border, five carts being needed for the trunk of a single tree. Local sources said the timber mafias were so powerful that even armed forest guards were unable to stop them and the police were ineffectual. Soon after the witness reported the matter to senior Forest Department officials, 20 armed police raided the labour camp and took away some of the stolen wood.

Millennium Tiger Conference in India

A three-day Millennium Tiger Conference was organised by the Government of India on 3-5 March 1999 as part of Silver Jubilee celebrations of its conservation initiative Project Tiger, which was launched in 1973. The Conference, in the form of an international workshop, aimed to take stock of the efforts made so far to protect tigers and the problems that remain unsolved, and to suggest future actions to ensure the survival of the tiger in the wild.

The conference was attended by Environment Ministers from Bangladesh, Bhutan, Malaysia, Myanmar, Nepal, Russia, Thailand, Vietnam and the United Kingdom, as well as conservation experts from India and abroad. The Conference adopted The Millennium Tiger Declaration (see below).

India's Vice-President, Krishan Kant, called for a “new mental attitude” towards tiger conservation and a global effort, not only by tiger-range countries, but also other developing and developed countries directly or indirectly connected with wildlife protection, in saving the big cat.

“There has to be a global commitment to face all the challenges, resolve all problems and secure the future of the tiger,” he stressed.

The Conference was followed by a meeting of the Global Tiger Forum, a Regional Agreement initiated by India in 1994 following a meeting in New Delhi of 11 of the 14 tiger range states. The Forum aims to eliminate illegal trade in tiger parts, increase the protected area network of tiger habitats and promote training, awareness building and scientific research.

So far India, Bhutan, Myanmar and Vietnam have joined the Forum and, with ratification by Bangladesh at the Millennium Tiger Conference, this brings the number of range states up to the minimum of five required for the Agreement to come into force.

Spring 1999
THE MILLENNIUM TIGER DECLARATION

Aware of the serious crisis facing the tiger across Asia, more than 150 participants from all over the world gathered in New Delhi for the Millennium Tiger Conference organised by the Ministry of Environment and Forests, Government of India, from 3rd to 6th March 1999. Bangladesh, Bhutan, India, Malaysia, Myanmar, Nepal, Russia, Thailand and Vietnam represented the Tiger Range countries.

In-depth and intensive discussion on the plight of the tiger across its range led to a renewed commitment to restore, protect and increase tiger habitats, reduce the consumption of tiger derivatives and ensure that the Millennium Tiger Declaration creates the necessary climate to save the Tiger.

Realising

- That the tiger is a symbol of biodiversity and has a right to live in inviolate habitats.
- That the protection of the tiger and the conservation of biodiversity is a vital national, regional and global concern.
- That the support of all governments of the world is essential for tiger conservation and, therefore, environmental and natural resource management policies of tiger range and non-range countries must be consistent with the spirit, requirements and goals of global tiger conservation.
- That continuing cooperation between all tiger range countries is a necessary step for the better management of tiger habitats and transboundary initiatives for coordinated management are vital to the safety of tigers.
- That the involvement of international conservation organisations, NGOs and the participation of local communities in conservation initiatives are essential to ensure the future of the tiger.
- That scientific research projects and sharing of information are exceedingly important for the design of field strategies that will effectively manage populations of wild tigers.
- That education and awareness across the world is essential in dissuading consumer countries from using tiger products and derivatives.

And considering

- That because the distribution of tiger across its range spans a great diversity of bioregions, including many biodiversity hot spots.
- That its conservation in nature is provenly a potent means of conserving a wide range of biodiversity.
- That considerable habitat for tiger continues to be appropriated by mega-development projects of hydropower, irrigation, mining and the like and the pressures of residual habitats get compounded by the humans displaced by such development intervention.
- That the impressive gains of special measures for tiger conservation initiated in the early 1970s, particularly in the countries of South Asia, have lately come under threat from habitat shrinkage and degradation as well as from demand for tiger body parts and derivatives from countries outside the region.
- That habitat degradation is resulting from excessive livestock grazing and other pressures of increased population whose community resource base has also shrunk and degraded.
- That considerable extent of tiger habitat in the range states lies outside the PA network in the production forests which suffer such degradation, not only from pressures of local people, but also from forest management induced collection of non-timber forest products (NTFP).
- That large investments are needed to conserve tiger by mitigating pressures on tiger habitat through ecodevelopment, proper buffer zone management around PAs and participatory forestry management in forests outside PA network.
- That as long as there is demand and legal as well as illegal availability of tiger parts and derivatives, it will be virtually impossible to control poaching of wild tigers.

Recommends

- That countries of the region that share international borders must cooperate in time-bound programmes to manage both tiger populations and habitats in and outside transborder areas and other protected areas.
- That all tiger range states strengthen regional co-operation by frequent meetings, exchange programmes, collaborative research and capacity building, and share information with respect to the tiger.
- That all countries across the world, which may not have tigers, join actively in an effort to save them by supporting tiger range countries with funds and other expertise.
- That tiger range countries pursue innovative land-use policies that recognise the vital importance of tiger habitats in the sustainable development of the country, thereby ensuring that large-scale developmental projects with the potential to destroy tiger habitats are restrained and restricted.
- That international donor agencies support innovative tiger conservation initiatives and fund programmes to discourage the use of tiger derivatives in traditional medicine, including finding renewable alternatives and encouraging interface between technical/scientific experts and user groups.
- That national legislation in tiger range and other countries across the world be strengthened and enforced in order to eliminate poaching and illegal trade in wildlife and its consumption in medicines and other derivatives. All countries of the world must enter into proper international conventions like CITES to ensure the elimination of this illegal trade.
- That NGOs all over the world focus and intensify their campaigns and interventions to educate and increase public awareness, create political will, lobby for conservation and join hands to save the tiger on the eve of this millennium.
- That the range countries supplement their contribution to tiger conservation by evolving mechanisms requiring PA revenues to be reinvested into tiger conservation.
- That the model established by the US Rhino and Tiger Labelling Act and the EU CITES Regulations be fully implemented and similar regulations be adopted in all other consumer countries.
- That consumer countries immediately enact and rigorously enforce new and adequate legislation to ban import, export and sale of tiger parts and derivatives.
- That effective mechanisms for transboundary co-operation be ensured through:
  - Communication networking
  - Exchange visits
  - Training, research and capacity building
  - Wildlife trade monitoring and control
  - Compatible management plans for transboundary PAs for coordinated management
  - Utilise fully the existing facility of «Wildlife Crime Subgroup» of the Interpol.
- That the role of media in generating public opinion is well recognised and this role needs to be discharged in an effective manner.

The tiger is one of the greatest indicators of the health of our ecological system and is symbolic of the natural treasure of Planet Earth. The natural heritage of this world and its protection and conservation is not only a vital concern for us today but will determine the quality of life for future generations of people. Saving wild tigers, therefore, is of vital international concern now and for the future.

THE MILLENNIUM TIGER CONFERENCE PLEDGES ON THIS DAY TO ENSURE THE FUTURE SURVIVAL OF THE WILD TIGER

CAT News 30
India and Nepal Agree on Trans-boundary Wildlife Conservation Measures

Wildlife knows no human borders and conservation often suffers because of lack of coordination of efforts in neighbouring countries. India and Nepal have set a good example with an agreement on bilateral cooperation on trans-boundary protected areas and control of illegal trade in fauna and flora.

Government delegations, meeting in January and April 1999 agreed to establish a communication system between protected area managers and maintain a close dialogue and exchange of information, with quarterly meetings between managers. The links will be for Sukhla Phanta and Royal Bardia reserves in Nepal with Dudhwa and Katerniaghat in India; and for Royal Chitwan and Parsa in Nepal with Sohagi Berwa and Valmiki in India, all areas which are especially important for tigers and great-horned rhinoceroses.

Some new reserves are expected to be created in India to ensure protection for animals, such as swamp deer, elephants and tigers which cross from Sukhla Phanta in the south-west corner of Nepal, and to maintain rich grasslands in the area. Another reserve is proposed on Indian-leased Nepalese land at the Koshi barrage to link up with Nepal's Koshi-Tappa reserve.

Measures will also be taken to facilitate movement of aquatic animals, such as crocodiles, river dolphins and fish, in major rivers which cross the borders.

The two countries agreed on cooperation in research pertaining to trans-boundary conservation; training in forensic identification techniques and mapping and habitat assessment utilising the Wildlife Institute of India and the Nepal Conservation Research and Training Centre; and harmonisation of the Indo-Nepal Trade Treaty of 1996 with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

WWF's Tiger Conservation Programme agreed to fund compensation for cattle losses on Indian territory adjacent to protected areas, while WWF Nepal is to explore the possibility of support with the government.

Funding will be sought for collection of information to curb poaching and illegal wildlife trade across the border.

National Status Survey for Tigers in Cambodia

by Kristin Nowell¹, Sun Hean², Hunter Weiler³, and J.L. David Smith⁴

Introduction

Status surveys for the tiger in Cambodia were recommended as a high priority project in the Cat Specialist Group’s Cat Action Plan (Nowell and Jackson 1996). Cambodia has some of the most extensive and unfragmented stretches of forest in Asia, with forest cover estimated at close to 70% in the early 1990s (UNEP 1995), high compared to neighbors Thailand (21%), Vietnam (18%) and even Laos (54%) (Collins et al. 1991). Much of the country is designated as Level I (top priority) by a joint WWF/WCS tiger habitat ranking exercise (Dinerstein et al. 1997). Cambodia clearly has the potential to support a significant national tiger population. However, as emphasized by Rabinowitz (1999) in his review of information on the status of the tiger in Indochina, “despite the extensive remaining forest cover, we know almost nothing about tiger distribution in Cambodia.”

Three decades of conflict have kept most of the country off-limits to the conservation community. Known threats to the tiger in the 1990s included widespread illegal logging (Global Witness 1997, DAI 1998) and widespread trade in tiger parts (Martin and Phipps 1996). Cambodian forestry officials have estimated the population at 100-200 tigers (Jackson 1997) and 150-300 (Smith et al. 1995, in Jackson 1998). However, in the government’s draft national tiger action plan it is estimated that 100-200 tigers were being traded each year in the markets in Phnom Penh and Poipet (MOE 1996). The thriving trade indicates that tigers are still sufficiently numerous in Cambodia to supply it, but under such pressures time is running out.

In 1998, CAT – Cat Action Treasury organized a national survey of hunters to gather information on tiger distribution and develop a more quantitative basis for evaluating tiger status in the country. The survey estimates tiger and other large mammal distribution and abundance based on information from hunters (Weiler et al. 1998, Duckworth and Hedges 1998). Here we present preliminary data on the geographic distribution of tigers in Cambodia (or first order habitat selection [Miquelle et al. 1999]), and make a rough estimate of potential tiger numbers. A more in-depth analysis is in preparation.

Methodology

From January to March 1998, CAT cooperated with the Wildlife Protection Office of Cambodia’s Ministry of Agriculture and Forestry to interview local hunters around the country about the status of the tiger and other large mammals. The interviews were conducted by a team of five graduates of the forestry program at the Royal Agricultural College in Phnom Penh (the five have since been hired by the Ministry of Forestry). The students had done undergraduate theses on wildlife utilization in Cambodia, and were experienced at interviewing and working with local hunters in different regions of the country. The team interviewed 153 hunters in 35 districts (100 villages in 13 provinces), areas selected from maps as having good forest cover and low human populations. The team brought back information on wildlife from parts of Cambodia never before visited by biologists.

The interview questionnaire had three parts. The first part listed 29 large mammal and six avian species and, if a species was indicated by the hunter as present in his area, he was asked to rank its abundance as High, Medium, or Low. Photographs were used to identify species, but no ranking guidelines were given. The second part asked the hunter questions about his forest experience, to help us judge the quality of the wildlife status information and to develop a profile of Cambodian hunters.

The third part asked specific questions about tigers. Informants were asked how many times they had seen tigers, their tracks or their kills, and the most recent time tiger was seen. They were asked about incidents of livestock predation or man-eating.
We asked them to estimate the number of tigers living in the areas where they hunt, and had them describe their hunting areas and outline the boundaries on local maps. We asked if they knew how many tigers had been killed in their area in the last year, the number of people who hunt tigers, and for information on tiger trade, including prices and market destinations. Despite the sensitivity of these issues (hunting of tigers has been illegal in Cambodia since 1994), most hunters were open about their activities: a hunter from the Cardamom Mountains region took the interviewer into the forest with him and allowed him to photograph the carcass of a tiger he had shot. Interviewees were provided with small cash and food gifts for their time and trouble.

To determine distribution of tigers we digitized the individual hunting territory maps sketched out during the interviews. We extrapolated hunter reports of tiger occurrence to a larger area to include remote areas of habitat which were not reached by the interview survey. This larger area was based on forest cover maps developed by IUCN liaison officer David Ashwell (1997). He delineated forest areas greater than 10 km distance from any village using data on village location and land-use obtained in 1989 by the Mekong Secretariat (1991). These base maps were digitized by the International Resource and Information Centre (IRIC) and IUCN in Phnom Penh. Some of the forests included in our wilderness areas have been logged, according to 1997 satellite imagery analyzed by a World Bank-funded study (DAI 1998).

We scored hunter tiger abundance rankings 0 for no tigers, 1 for Low, 2 for Medium and 3 for High. These subjective rankings were averaged for each distinct geographic region and then scaled to a range of hypothesized tiger densities (zero to 1.5 resident adult tigers/100 km², and zero to two resident adult tigers/100 km²) (see Discussion).

Results
Hunters indicated tiger presence across approximately 56,000 km² (Figure 1), a figure derived from totalling the area of their individual hunting territories. For our analysis of tiger status, we extended potential tiger range to 65,000 km² (Figure 2) to incorporate remote habitat where no interviews took place (especially Northern Plains, South of Sre Pok, and Virachey regions). Forest areas within 10 km of a village were not included because habitat near villages generally had higher hunting pressure and lower prey abundance.

Based on our distribution data and hypothesized ranges of tiger density, we estimate that Cambodia harbors approximately 535-717 resident adult tigers (Table 1), significantly more than indicated by previously published estimates. Two large, sparsely inhabited areas emerge as tiger strongholds, each having an estimated 150-200 tigers: the hilly tropical rainforest in the Cardamom mountains in the southwest (elevation 200-1,500 m), and the dry and semi-deciduous forests south of the Sre Pok river in the east (Mondulkiri province). Hunters from the Cardamom (Kravanh) mountains area reported significant levels of man-eating. Interviewees estimated over 100 incidents in three adjoining provinces during the late 1990s. The Virachey region, centered on the Virachey protected area in the mountains bordering Laos and Vietnam, is a smaller but still significant area, with tigers reported to occur at medium abundance.

In the rest of the surveyed portion of the country, tiger populations are generally characterized as low. These low density areas have higher human populations or a history of heavy logging activity. Still, tigers do occur throughout most of Cambodia (out of 153 interviews, only five people said there were no tigers in their area). In the open dry forests of the Northern Plains region, 100% of hunters had recently seen tigers and tiger tracks, reported recent trade activity, named consistent and current prices for tiger bone, and were aware of at least one tiger that had been killed around their villages in 1997.

Overall, 60% of hunters reported active trade in tiger parts where they live. The only areas not reporting trade were Kampong Thom, Northeast Buffer Zone, and Phnom Oral – the areas with the lowest estimated tiger populations. The price of a tiger was typically reported per kilogram of bone (as opposed to a whole carcass), and averaged US$169. Most hunters described tiger populations in their area as declining (74%), although some said increasing (19%), mainly in the Cardamoms. Hunting was indicated as the primary cause of the decline, with logging predominating in other areas, especially Kampong Thom and Pailin.

Discussion
Using interviews with knowledgeable local people to map species distribution can provide a useful tool for planning biological surveys. Recent tiger and large mammal surveys have focused largely on Ratanakiri province (Northeast Buffer and Virachey regions: Desai and Vuthy 1996, Timmins and Soriyun 1998, T. Lynam pers. comm.), while the hunter interviews point to the importance of two large areas with potentially large tiger populations – the Cardamom mountains and the South of Sre Pok region.

Our estimate of approximately 535-717 tigers in Cambodia is based on three components: a subjective hunter evaluation of tiger abundance, a projection of geographic distribution of tigers, and two hypothesized maximum tiger densities (1.5-2 tigers/100 km²). Each of these components are discussed below.

1. Hunter descriptions of tiger abundance. Hunters were interviewed separately and not in groups. There was a high degree of agreement on density among hunters. By inspection there was also a strong correlation between tigers and large prey (e.g., sambar deer, banteng and gaur) distribution and abundance. Our final report will analyze the degree of concordance among hunters and the association between hunter estimates of tiger and prey distributions and abundance.

2. Size of current tiger range. By predicting tiger occurrence in unsurveyed areas, we risk overestimating tiger range in the country. On the other hand, the 10 km buffer from villages may have eliminated some good tiger habitat (some areas where hunters reported tiger presence were eliminated by the village distance selection criteria). Our estimate of tiger habitat is more conservative than recent estimates of forest extent of more than 100,000 km² (UNEP 1995, DAI 1998). We have no data on the degree to which edge areas have depleted prey populations. Research in Thailand (Pete Cutter, Tony Lyman in progress) and Nepal (Mahendra Shrestha in progress) is working toward developing models to predict prey distribution in relation to edge and other habitat variables, and also to relate prey abundance to remote sensing data.

3. Tiger density estimates. High tiger densities of 3-5 adult tigers per 100/km² have been reported from some Asian protected areas (Franklin et al. 1999, Karanth et al. 1999, Smith et al. 1999). In Indochina, density estimates derived from field studies are available only for Thailand. Rabinowitz (1993) used an
average density of one adult tiger/100 km² in his estimate of the tiger population in Thailand, and further reduced this density estimate according to levels of threat. His density estimate was based on his study in Huai Kha Khaeng Wildlife Sanctuary in Thailand. Subsequent camera trapping at that site revealed about 3 tigers/100 km² (Saksit, personal communication). Smith et al. (1999) used an estimate of 1.5 tigers/100 km² for habitat with a high diversity of prey (e.g. having sambar, one other large prey species, barking deer and wild boar). We used a maximum density estimate of 1.5-2 tigers/100 km². It is important to note that these density estimates are not based on field data from Cambodia. Such data are needed as are data on the abundance of prey species. If the strong relationship between prey abundance/biomass and tiger distribution and abundance exists, as suggested by Miquelle et al. (1999), Karanth et al. (1999), and Smith et al. (1999), then a density in the range we suggest may be a reasonable starting point for areas reported to have a high density of prey (e.g. at least four species of tiger prey, at least three species at high density). As more quantitative measures of tiger and prey abundance are undertaken both potential and actual density estimates will be refined.

Estimating tiger numbers is a difficult and controversial exercise. Our work falls short of the standards set by long-term scientific studies carried out in other tiger range states (Seidensticker et al. 1999). We realize the limitations of the data for each component used in making our tiger population estimates. However, for Cambodia, it represents major progress in understanding tiger status and distribution. From the perspective of the international conservation community, our estimate should help focus attention on the importance of Cambodia, and draw the investment necessary to help safeguard what is likely to be one of the world’s largest tiger populations.

To use a metaphor which draws from Cambodia’s recent history of conflict, the country is essentially at Year Zero in terms of a conservation infrastructure and knowledge base. Cambodia is new to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), many people are desperately poor, and there is a thriving wildlife trade. But much has changed since our survey was conducted. Pol Pot is dead, the Khmer Rouge has surrendered, and for the first time in many years Cambodia finds itself at peace. In response to international concerns about uncontrolled logging (due largely to the work of the London-based NGO Global Witness), a moratorium on logging was imposed in early 1998, backed by military force. At the same time, a total ban on the hunting of wildlife was also declared. International conservation organizations are returning to the country: IUCN, WWF, WCS, FFI, and the University of Minnesota are among the organizations now beginning to help build research, monitoring and enforcement capacity in Cambodia.

Our methodology of hunter interviews has much to offer as a large mammal population monitoring system. By emphasizing cooperation with hunters in monitoring wildlife status and recruiting some of these hunters as staff, government authorities can make use of their knowledge of local wildlife, and provide education and employment opportunities as an alternative to tiger hunting.

As a follow-up to our survey, the Wildlife Protection Office carried out a series of tiger conservation education and training workshops which reached more than 250 local government officials. Many of these officials heard about the importance of their tiger populations and the need to take action to conserve them. An educational poster was also printed and distributed to villages in tiger range. It stresses that hunting tigers is illegal, and argues that tigers have benefits for people, including “keeping bandits out of nearby forests”.

Acknowledgements

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Table 1. Estimated number of tigers in Cambodia based on hunter interviews. Averages of relative abundance estimates by hunters were converted to estimates of average potential tiger densities. Two scales were used for potential tiger densities: zero to a high of 1.5 resident adult tigers per 100 km², and zero to two resident adult tigers per 100 km².

<table>
<thead>
<tr>
<th>Region (number of interviews)</th>
<th>Average tiger abundance (scale 0-3)</th>
<th>Area in km²</th>
<th>Density scale zero to 1.5 resident adult tigers/100 km²</th>
<th>Density scale zero to two resident adult tigers/100 km²</th>
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<td>Estd. density</td>
<td>Estd. no. tigers</td>
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<tr>
<td>1. Cardamom Mountains (31)</td>
<td>2.74</td>
<td>11,848</td>
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<td>2. Phnom Oral (9)</td>
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<td>3. Elephant Mountains (12)</td>
<td>1.33</td>
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<td>4. Kampong Thom (11)</td>
<td>0.82</td>
<td>5,794</td>
<td>0.41</td>
<td>24</td>
</tr>
<tr>
<td>5. South of Sre Pok (37)</td>
<td>1.95</td>
<td>14,971</td>
<td>0.98</td>
<td>147</td>
</tr>
<tr>
<td>6. Northeast Buffer (8)</td>
<td>0.88</td>
<td>6,082</td>
<td>0.44</td>
<td>22</td>
</tr>
<tr>
<td>7. Virachey (12)</td>
<td>2.08</td>
<td>4,787</td>
<td>1.04</td>
<td>50</td>
</tr>
<tr>
<td>8. Northern Plains (17)</td>
<td>1.18</td>
<td>10,736</td>
<td>0.59</td>
<td>63</td>
</tr>
<tr>
<td>9. Palilin (16)</td>
<td>1.25</td>
<td>3,771</td>
<td>0.62</td>
<td>23</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>65,242</strong></td>
<td><strong>535</strong></td>
<td><strong>717</strong></td>
<td><strong>130</strong></td>
</tr>
</tbody>
</table>


Figure 1. Cambodia: Distribution of hunting territories where hunters reported tigers present (total 56,000 km²)

Figure 2. Cambodia: Distribution of nine estimated tiger populations (described in Table 1). Forest areas shown are more than 10 km distant from villages. Most of these areas (approx. 85%) were covered by our survey. Also included are other relatively remote forest areas (approx. 15%) where tigers are likely to occur but no interview data was available.

CAT News 30
Fauna and Flora International Regional Wildlife Surveys in Cambodia

North-eastern Cambodia

A wildlife survey of two river basins in north-eastern Cambodia by a team from the UK-based Fauna and Flora International found no evidence of tigers or any other large cats, and very few signs of elephants, according to a report in the society’s newsletter (February 1999).

The survey was conducted in conjunction with training for staff from the Cambodian Wildlife Protection Office.

The newsletter said: “Historically, north-eastern Cambodia was viewed as being very important for large mammals, but attempts over the past few decades to assess the status of globally-threatened species living there have been hampered due to concerns over security. The survey area is still largely undeveloped and retains extensive wetland, seasonal meadows, dipterocarp and semi-evergreen forest. The assessment focussed on species at threat along large rivers and wetlands where pressure on wildlife from local communities and logging operations appeared to be very low.

“...The presence of large mammals was in sharp contrast to that of birds. There was no evidence found for tigers, or any other large cats, and very few signs for Asian elephants. Little or no evidence was found for several important deer species, and the same picture emerged for four sympatric wild cattle and buffalo species.’’

Kravanh (Cardomom) Mountain Range

An FFI field team also carried out the first survey of the Kravanh (Cardomom) Mountain Range, in collaboration with Cambodia’s Wildlife Protection Office, ARA (German working group on rainforests) and Cat Action Treasury. Physical evidence of tiger was found, as well as of gaur Bos gaurus, dhole wild dog Cuon alpinus and many other species. A press release said: “This confirms the importance of the Kravanh Mountains for the conservation of threatened wildlife, but also suggests that much more work needs to be done to discover what other species remain in the region.’’

Comment by Hunter Weiler, co-author of the “National Status Survey for Tigers in Cambodia”

The report low populations of large mammals along the Sesan and Srepok rivers are consistent with the findings of the National Status Survey for Tigers in Cambodia. The Sesan to Srepok sub-region, which is the large area of Ratanakiri and Stung Treng Provinces between the Se San and the Srepok, is largely devoid of large mammals due to human population and land conversion. The area contains the portion of the Lonphat Wildlife Sanctuary north of the Srepok, but this portion of the sanctuary is highly degraded and shot out. Hunters in the sub-region report very low tiger and other large mammal populations. Rivers are generally the heart of ecosystems, but the Se Kong, Se San and Srepok are major ecosystem boundaries for large mammals. In fact, large mammals generally avoid the major rivers.

Our report refers to the Sesan-Srepok subregion as the Northeast Buffer and says that the only areas in Cambodia surveyed that did not report tiger trade were Kampong Thom, Northeast Buffer Zone and Phnom Penh – the areas with the lowest tiger populations. It is only north of the Sesan in the Virachey region and South of Srepok that large mammals are reported in medium and high numbers.

International, Indochina Programme and the Wildlife Protection Office, Department of Forestry, Cambodia, Hanoi and Phnom Penh.


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2 Wildlife Protection Office, Ministry of Agriculture, Forests and Fisheries, 40 Norodom Blvd, Phnom Penh, Cambodia
3 Conservation Biology Program, 1980 Foulwell Ave, University of Minnesota, St. Paul, MN 55108, USA

Spring 1999
Hunters Using Land Mines to Kill Cambodian Tigers

Reuters reported from Phnom Penh (27 January) that villagers and soldiers in remote forests in northeastern Cambodia were using home-made land mines to catch and kill tigers, whose body parts were being sold on the black market. The governor of Ratanakiri province said he had ordered district officials to stop the illegal killing.

"Villagers and soldiers are laying down home-made mines to catch tigers," Kep Youtema told Reuters by telephone from the Ratanakiri. "They can't get them with guns so they put down mines instead."

Businessmen who buy the dead animals for their body parts are supplying soldiers and villagers in Vounsai district with gunpowder for the mines, the governor said.

Andy Maxwell, who heads a World Wide Fund for Nature park ranger training programme in Virachey, said: "These homemade things have probably been in use for at least a couple of years."

Conservation scientist Eric Wikramanayake first came across the method on a reconnaissance trip through the 332,500-hectare protected area last year. He found that poachers were using explosives and detonators bought from middlemen, who are often the people commissioning them to kill the tigers. Each mine uses about 2kg of explosive and costs less than US$20 (HK$154.6) to make. To ensure the mine is effective, the hunters first have to find a trail with fresh tiger tracks before setting up a rudimentary pen.

"They build a fence to enclose a section of the trail, leaving two small entrances into the enclosed area," Wikramanayake said, adding "A dead Sambar deer is placed as bait within the enclosure and a trip wire attached to a mine is set up at each of the entrances. The tiger smells the bait, walks through the opening and sets off the mine."

The threat of damaging the pelt — worth US$100 or more to the poachers — does not worry them. It is the bones that matter. Vietnamese traders across the border sell tiger bone for up to US$350 a kilogram for consumption in Vietnam, China and other international markets.

Tiger Attacks on People in Nepal

Between 1979 and 1996, a total of 22 persons were killed by tigers in and around Royal Chitwan National Park. Recently, in a period of 11 months and 12 days between 21 April 1998 and 3 April 1999 no fewer than 11 were killed, almost one victim a month, in contrast with 1.3 a year during the earlier period.

A total of five tigers were involved, four females and one male. All consumed flesh from one or more of the people they killed. In every case in which the kill was not disturbed it was eaten.

An old male, 14-years-old when he was destroyed, had already killed one person in 1996 and wounded another in 1997. He killed five more persons and wounded two others in 1998-99. The first five victims were villagers trespassing inside the park, in some cases inadvertently approaching sites where the male was resting during the day. After being wounded in a fight with another male he began to attack people outside the park close to villages, after which he was promptly destroyed by the park authorities.

An old female, radio-collared in 1993 and then lost track of, left the park in August 1998, and went into Saurah village. At 9.45 at night she entered a house, dragged a man out, and fed on the remains a mere 20 meters away. Two days later she was captured by the authorities and removed to the zoo in Kathmandu.

In February 1999, a resident tigress known to have cubs killed and partly ate a trespassing villager just inside the park.

On 4 March a tigress killed two persons in the forest half a kilometer from a village in Mari, here forming the buffer zone of the park not far from the border with India, where Valmiki Tiger reserve adjoins Nepal. She later killed a bull at the edge of the settlement and was poisoned by the villagers.

A month later, at another village in Mari, Syaulibas, only six kilometers away, there was a case so strange and unusual that it is worth telling the story in detail. On the night of 2 April a young tigress emerged from a degraded forest five kilometers from the Indian border and entered a village of scattered houses. Moving through open, barren fields she located an unoccupied house in which the owners had left some meat. Circling the building the tigress unsuccessfully tried to enter the house, leaving deep claw marks on all four of the outer walls. Heading back south in the direction of the forest, at about 3.30 in the morning, she found a house where an elderly man and his wife were sleeping on a wooden cot on the outside verandah. Seizing the woman, 69-year-old Sheeta Kumari Pant, the tigress dragged her a few meters around the back of an adjacent building. By the time the husband returned with help to drive off the tigress she had eaten part of the women's head and upper torso.

At 7.45 on the evening of the 3rd, when there was still plenty of light, the tigress returned to the same house. The recently-widowed man, Gyan Bahadur Pant, and a friend, Dhan Bahadur Romawat, were seated on the same verandah where the woman had been seized just 40 hours earlier. Passing by, and totally ignoring the two men less than four meters away, the tigress went through a doorway into the adjoining building and attacked a woman inside, 35-year-old Devi Adhikari. Seizing sticks, Gyan Bahadur and his companion went into the house after the tigress and clubbed her, causing her to leave the building, but not before fatally injuring the woman.

The same night, the tigress attacked a bull tethered in front of a house, but was driven off before she succeeded in killing it. The animal died later of its wounds, and it was by waiting over this carcass that park staff darted the tigress with a tranquilizer when she returned to feed. In emaciated condition, her hind quarters wasted way, she also was removed to the zoo.

A Nepalese team had just recently conducted a survey at Valmiki and reported extremely dry conditions in the part of the reserve close to Nepal, exacerbated by months without rain, and found evidence of ungulates only at very low density. It is probable that the two tigresses that came to the villages in Mari were from Valmiki, having traversed dry, marginal habitat almost devoid of prey. They were hungry and desperate tigers.

Man-eating tigers almost invariably attack their victims during daylight hours. It is almost unheard of, even for confirmed man-eaters, for tigers to go into villages and
enter buildings to seize people. But two tigers, never known to have previously attacked humans, did just that in Nepal, in two widely-separated localities; one in Saura, a village in the buffer zone to the north of the park, and the other, Syaulibas, in the buffer zone to the south.

No action was taken against the tigress with cubs that killed a man inside the park, but the park authorities, whose jurisdiction also includes the buffer zone, responded rapidly and professionally to deal with the four problem tigers that killed people outside the park.

Chitwan was not the only place in Nepal where there were human fatalities caused by tigers. Three people, two men and a woman, were killed by a sub-adult male tiger in Bardia District, close to but outside the Royal Bardia National Park and its buffer zone, between 17 March and 18 April. As in Chitwan, the authorities responded quickly and destroyed the tiger the same day it killed its last victim.

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Men and Tigers in Sariska Tiger Reserve, India

by João Pedro Galhanho Alves *

The villagers' buffaloes are also food for tigers, and in villages like Aripura, situated in the core of the Reserve, about 2-4% of the cattle fall prey to the carnivores every year. Farmers, who also have a great respect for wildlife, also inhabit some villages, but their small fields only occupy a small part of the reserve area. The villagers graze their buffaloes in the jungle day after day, and they walk in the jungle every day so that they meet tigers quite often. After the rainy season and during several months the villagers also graze their buffaloes at night.

In general, tigers, as well as leopards, dholes and caracals, do not attack people. The villagers never kill or attack them, so that they do not have to be aggressive towards people in order to defend themselves. For example, when a leopard passes near a group of villagers, they just look at it quietly while it walks slowly on and disappears among the vegetation. When a villager meets a tiger, which happens to many villagers (and mostly to the buffalo herders) once, twice or more a year, the tiger usually just looks at the person for some seconds and then goes away. In some cases, it keeps looking at the person until they go away, without threatening them.

Normally, the villagers meet the tiger at a distance of 10 or more metres. The reason for this is that the low density of the local vegetation usually allows the tiger and the person to see each other at such a distance and when they meet, they hold back. But, if man and tiger do not detect each other in time, their encounter may be much more close, even of 2-3 metres. For example, a villager says: "One night I was walking with the buffaloes in a zone of dense vegetation. Suddenly, I saw a tiger just four metres in front of me, coming in my direction, so that we met face to face. The tiger walked away along the bed of a dry creek. The buffaloes started running in the direction of the village and I did the same. It was a young tiger, about two years old".

Usually, when a tiger meets someone, it shows its surprise by a short puff (Prater 1992) and stands looking at the person. Then, after some seconds, it goes away. The villagers say that the tiger is prudent in the presence of a man "because the tiger knows that it can kill him, but it also knows that the man can defend himself with a stick and may wound it". Sometimes, if the person is in the way of the tiger when it is eating prey, or if a female is taking care of its cubs, the tiger does not go away, staying immobile and looking at the person till they retreat. In some cases, the tiger may even sit looking peacefully at the person. But if the tiger feels disturbed by someone who does not retreat, it may growl or roar. Exceptionally, if someone behaves wrongly, the tiger may attack, scratching or even biting and killing.

Many testimonies concerning man and tiger encounters refer to the most impressive effect that the tiger produces on man, saying that meeting a tiger in the wild gives such an intense feeling that it has a paralysing effect (Thapar, undated). Usually, this paralysis only lasts a few seconds, but, in some cases, it may be completely dominant, blocking any other kind of reaction in the presence of the tiger. But usually, after this short period, the person is dominated by fear that lasts until they feel that there is no more danger of being attacked. This fear stimulates the person to react in the presence of the tiger in order to save their life by getting away. Many villagers are so used to meeting tigers from their childhood that the presence of the animal does not cause fear any more. For example, an old villager says: "I am not afraid of the tiger. I see it all the time. For me, it is not possible to be afraid of the tiger as I live here". But, in general, they
feel some degree of fear. As another villager says: “When I see a tiger I am afraid. Of course, the tiger can kill me”.

In spite of these general rules, the reactions of each person in the presence of a tiger may be very different. The villagers point to some rules of behaviour that they respect when they meet a tiger while grazing their buffaloes or walking in the jungle.

These rules, not rigid, are as follows (in chronological order):

1. A person meeting a tiger must stop and not move. They must never run, or turn their back to the tiger. They must not squat. They must remain standing and must never make abrupt gestures or move in the tiger’s direction.

2. The person must look fixedly into the tiger’s eyes, never taking their eyes off those of the tiger.

3. The person should “talk to the tiger” without aggressiveness, making the following exclamations, with a loud voice: “Ahauh! Ahuahu!...”, or other variants, but, in all cases, alternating the U and A sounds. According to the villagers, these vocalisations “act on the tiger’s mind and calm it”. As a villager says: “We say ‘Ahuahu’ and the tiger stops. ‘Ahuahu’ has some effect on its mind”. However, some old villagers, such as Baxi Gurjar, from Aripura, make a sound that seems a mix of a snake’s hiss and purring, which they say also “keeps the tiger calm”.

4. If the person has a walking stick or a crook (as villagers normally do) they should bang it on the ground, making a noise, while making the sounds.

5. If the tiger takes a step forward, the person should take a step back; one step back for each tiger step.

6. Making the same exclamations and banging the ground with the stick, the person should keep moving slowly backwards.

7. The person should never walk in the direction that the tiger appears to have gone. As in many encounters the tiger and the person meet face to face, this means that the person should not walk straight back but at an angle to the tiger’s path.

8. When the person has distanced themselves about 20 meters from the tiger, they can turn their back to the tiger and move away more quickly, but always keeping visual contact with the tiger.

9. Even if the tiger usually goes away, the person should move away some hundreds of metres from the meeting point. If possible, the person should enter a safe place, such as a village or a house.

It is difficult to understand scientifically how this behaviour and the sounds influence the tiger’s behaviour, but, according to the villagers, “they work”. Some village’s accounts illustrate well their encounters with tigers. For example, a buffalo herder from Kundelka village says: “I see the tiger two or more times a year, mostly by night and at a distance of nine or more metres. I say Ahauh! Ahauhu!” and I bang the ground with my stick. I never throw stones at the tiger. I am not scared as I see the tiger every year. I saw the tiger for the first time in my life when I was four or five years old. I thought that it was going to kill me. I got very scared. I made a noise with my stick. The tiger sat down. Then I moved away, slowly, looking behind me at the tiger. I love the tiger. It is not a problem”.

Another villager says: “I see the tiger five or seven times a year. When I see it I bang the ground with my stick and I say ‘Ahauh! Ahauhu!’. Normally, the tiger is 20 metres away from me. Last month the tiger came near my house at 10 p.m. I was sleeping. Then I heard the tiger go ‘Groaung’. I hit the window frame with my stick, saying ‘Ahauh! Ahauhu!’, and the tiger went away. It was coming to try to kill some buffalo”.

Villagers often meet the tiger when they are grazing their buffaloes. Sometimes, when the tiger approaches, the buffaloes sense its presence and become nervous and agitated and then run. In such cases, the buffalo herders run together with the buffaloes some hundreds metres until they feel the cattle and themselves safe. In other cases the tiger approaches the cattle and, when the buffalo herder sees it, he says “Ahauh! Ahauhu!” and bangs the ground with his stick, trying to persuade the tiger to go away. In many of these cases, the tiger goes away without killing a buffalo, disturbed by the presence of the herder.

The presence of the herder is an important guarantee of the cattle’s safety and, by their vigilance, the villagers avoid most of the tiger attacks. But sometimes the tiger attacks and kills a buffalo. When this happens, the villagers just leave with the rest of the cattle, without resisting the tiger. For example, a villager says: “This year one of my buffaloes was eaten by a tiger, one kilometer south of the village. I was with the buffaloes and I saw the tiger 50 meters away. The tiger killed the buffalo very fast. Then I left”. As the villagers say: “One should never get between a tiger and its prey”.

However, in 1959, Prabath Gurjar from Aripura village made the mistake of trying to drive a tiger from one of his buffaloes it had killed. Since then, he is the only man of the region (and maybe of the world) who has successfully fought a tiger. As he says: “I was in the jungle and the tiger killed a buffalo at four or 4.30 a.m. I was looking for the buffalo and I saw the tiger eating it. I spoke to the tiger to make it to go away. I made a noise with my crook. But the tiger didn’t go away and attacked me. It bit my right shoulder and my buttock. I grabbed the tiger’s nose with my fingers, sinking my nails in its nostrils. The tiger couldn’t breathe. Then it went away. I ran to the village. I put a bandage and salt on my shoulder and I went to the hospital. It was an old tiger.” It is still possible to see the deep scars of that fight in his shoulder and buttocks. Normally, such attacks do not occur in the region.

In spite of this, about once or twice a decade, it may happen that a tiger makes a demonstration of strength towards a villager, wounding him, but without intending to kill him. For example, according to the villagers: “In 1997, a young woman was cutting hay in the jungle and, holding the sickle, thrust her arm into a bush where a tigress was sleeping with her cubs. The tigress scratched her arm. She shouted, as did the other women who were cutting hay, and the tigress led her cubs away.”

Cases of people killed by tigers are extremely rare in the region. During the last two decades, only one man was killed by a tiger and, not surprisingly, he was an outsider, a sadhu (Hindu holy man) ignorant of the local environment and how to react in the presence of a tiger. It killed this man at night, on the Alwar-Jaipur road that crosses the Reserve. The villagers justify the tiger’s behaviour, saying that this man was killed “because he walked almost naked, with only a cloth around his hips, and so the tiger confounded him with an animal, maybe a big langur monkey. The tiger only took a bite and then it stopped eating as soon as it understood it was a man”.

The Reserve director, Sanjay Sharma, said: “Maybe what the villagers say about this event is true, but, in spite of what could be the reason for this attack, we must consider that as long as tigers exist in the area an accident may always happen.” The villagers explain that, “If the tigers almost never attack
people in the region it is because we don't kill the tiger and so the tiger does not kill us. We respect the tiger and it respects us. The tiger is a friend of men. We respect the forest; we don't kill the animals that the tiger needs to eat, and so it has plenty of food."

The villagers also manifest a deep admiration for the tiger. Being Hindus, they believe that the tiger is the sacred "vehicle" of the Goddess Durga, being an avenger who maintains the world's harmony by fighting against the demons' chaos. But they also respect the tiger because of cultural beliefs and for aesthetic and empirical ecological reasons. For example, they say: "The tiger is beautiful, very beautiful!" and "Because of the tiger the buffalo is not sick too often. Tiger breath is good for the buffalo", and "If there were no tigers or panthers, there would be too many sambar (deer) and nilgai (antelope) and so one day there would be no grass or trees, and there would be no forest". A local folk proverb says: "The tiger and the cow must drink from the same pool" (Galanho Alves 1995 and 1996).

Unfortunately, it is possible that in some decades neither Sariska's tigers nor the villagers' culture will exist. The Reserve area is relatively small and its tiger population of about 20 is isolated. Some officials and researchers propose the relocation of villages as a short-term solution (Johnsingh et al. 1997 and The Hindu 1999). Such relocations would be a traumatic and uncertain experience for people and would not change the conditions for the tiger's survival as these rural societies have little impact on the environment and they are well integrated with it. In fact, these societies, and their rich "tiger-culture", are a rare example of successful coexistence with tigers, other large carnivores and wildlife. They should be considered as an important research field, as a model for planning ecodvelopment strategies and as a part of India's cultural heritage (Galanho Alves and Garcia-Perea 1998). To save both the tigers and the village's culture, massive reforestation and habitat restoration programs are needed inside and (mostly) outside the protected area in order to provide conditions for the tiger population to grow and to disperse, as well as ecodvelopment programs for the villages that should include compensation for loss of cattle to tigers.

References

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The Bornean Tiger; Speculation on its Existence

by Erik Meijaard*

This short note presents and discusses references to the occurrence of the tiger Panthera tigris (Linn.) on the island of Borneo. The numbers in the text refer to Figure 1.

There is no scientific evidence to support the theory that tigers occur naturally on Borneo (Medway 1977). However, tiger skins (Hose and McDougall 1912, Sellato 1995), skulls (Nieuwenhuis 1904, Banks 1931), and canine teeth (Peranio 1960, Puri 1992 pers. obs.) have been observed in the possession of indigenous communities of the Sarawak interior and in West and East Kalimantan. Medway (1977) believed that these items had been imported.

Hooijer (1963) states that the recovery of the tip of an unerupted upper tiger canine from a superficial level in the excavation at the Niah cave in Sarawak (no. 1) suggests that the tiger may have been, until comparatively recently, a member of the native fauna. Unfortunately, Hooijer does not go into detail of how he identified this find. Remains from deeper levels in the cave had not been found in 1977 to corroborate the case (Medway 1977), and I am not aware of any finds since then.

One skull apparently existed in the Natural History Museum in London earlier this century and was labelled as "Borneo" (see Note). However, this skull may have been mislabelled. Furthermore, there is documentary evidence of tiger parts being introduced to Borneo by man. Nieuwenhuis, a Dutch anthropologist, brought tiger skulls and teeth from Java to Borneo as presents for tribal leaders of the upper Mahakam and Kapuas rivers in East and West Kalimantan respectively (Nieuwenhuis 1904).

Several authors mention evidence that the peoples of Borneo are at least very well aware of the tiger. In his study area in interior East Kalimantan (no. 2), Puri (1992) noted that tiger parts play an important role for the Penan and Kenyah people. Tiger teeth were used by community leaders for lie detecting and were considered to be very powerful. Only after 10 months did Puri get to see a set of six of them. Nieuwenhuis (1904) pointed out the great importance of tigers in traditional Bornean arts and religion; so much was the tiger worshipped and/or feared that it would generally be referred to only by a lesser name, 'aso' or 'dog'.

Sellato (1995) in his zoo-linguistic study reports that most Dayak languages have a specific term to refer to the tiger that is
quite distinct from other cats, such as the clouded leopard (*Neofelis nebulosa*). Also the Aoheng, a Bornean tribe of the upper Sungai Mahakam (Sungai = River, hereafter abbreviated as ‘S’) (no. 3), are aware of a number of details pertaining to the tiger’s habitat and habits. This suggests that the tiger may have occurred on Borneo in the past, or that the people who populated Borneo came from a region of South East Asia where tigers existed (Sellato 1983, 1995).

Abbott (in Lyon 1911), a respected zoologist, actually believed that tigers existed in his study area in west Borneo (no. 4). Based on local narratives he thought that a much larger cat than the clouded leopard occurred. He thought it to be very rare, as few whom he met had ever seen it. Also Witkamp (1932) refers to tigers, which were claimed to occur in the ‘Tjina-batangan’ area (no. 5) in northern Borneo in the *Natuurkundig Tijdschrift voor Nederlands Indië* of 1857. Finally, Gersi (1975) produced evidence of tigers on Borneo. He claimed not only to have seen a tiger near the S. Belayan (no. 6) in East Kalimantan, but he also took photographs of the animal. The two photos in his book clearly depict tigers. His explanation for this sighting was that in the past the sultans of Sarawak, Sabah, or Brunei must have imported these tigers from elsewhere. This explanation was considered scarcely plausible by Medway (1977), who thought that this report (if authentic) could only be evidence of a surviving indigenous population. In his book, Gersi (1975) further states that the nomadic Punan people of Borneo knew of a large, striped cat species that, unlike the clouded leopard, did not climb trees.

During four years of fieldwork in many locations on Borneo I have come across a considerable number of alleged tiger sightings. The most recent tiger report came from the area between S. Pari and S. Hanyu in Central Kalimantan (no. 7), where a tiger was said to have been heard in 1995, although no one managed to see it. The interviewees asserted that they knew the roaring of the tiger well enough to discern it from other animals. One Punan hunter told me he had had a clear tiger sighting on a logging road near the S. Belayan in East Kalimantan (no. 8) in the early 1990s. Another informant said he had seen a captive young tiger in a logging concession, near Bengalon in East Kalimantan (no. 9). This animal was described as being different from both the Sumatran tiger and the clouded leopard, by being largely brown-coloured with only faint stripes.

In the Central Kalimantan village of Tangiran (no. 10), old people told of a large striped cat different from the clouded leopard. One tooth was shown; it was said to be between one and two centuries old and once belonged to a tiger that lived in the vicinity of the village. Finally, one sighting was reported from the PT Domas Raya logging concession and dated back to 1987/88 (no. 11). Again it was said that the animal was faintly striped, and the size of a Sumatran tiger.

Apart from the above useful records, the interviewee in the PT Domas Raya logging concession told a more fanciful story. He stated that the local tiger lived in a cave and would only come out in the seventh month of the year. It was thought to be associated with hermits and ascetics who could take on the shape of this animal. The animal was said to only occur in the mountains and not in lowlands like the Sumatran tiger. A.H. Everett recorded similar traditions in which tigers were associated with caves (Banks 1931). These stories were centred on the Pupok Hill (no. 12), Serambo (no. 13), and Bukit Rimong (no. 14), and mostly concerned a flying variety of the tiger that made weird noises in caves at certain seasons of the year (Banks 1931).

**Discussion**

It is impossible to judge the significance of the reported tiger sightings. Mjöberg (1930) already wondered about the apparent absence of tigers on Borneo, and it is indeed a mystery why the tiger appears absent from the island. The species occurs in a variety of habitats and seems to be very adaptable to different ecological conditions. On Borneo, prey species, such as sambar *Cervus unicolor*, bearded pigs *Sus barbatus*, or muntjacs *Muntiacus* spp. are common (pers. obs.), and, at present, there does not seem to be an ecological factor on Borneo preventing the tiger’s survival.

I hereby postulate four theories that could provide explanations for the tiger’s absence from, or the presence on, Borneo:

1. **Tigers never occurred on Borneo**

   The island of Borneo has been connected to Sumatra and Java several times during the Pleistocene when lower sea levels exposed the Sunda shelf. It is generally assumed that during the glacial most faunal exchanges between the islands occurred (e.g. Groves 1990). Tigers swim well and could certainly have crossed the rivers that dissected the exposed Sunda shelf. However, the drier climate during the glacials probably created open woodland savannah conditions on the shelf (for a discussion on this subject refer to Adams and Faure, 1997). It is therefore possible that the tiger, with a need for dense vegetation cover, and access to water (Sunquist and Sunquist 1989), found the exposed Sunda shelf too much of a barrier. Bronersma (1935) proposed an alternative explanation. He suggested that the tiger reached the archipelago at a time when Sumatra and Java were still connected, but already separated from Borneo (in the late Pleistocene).

2. **Tigers once occurred naturally on Borneo but became extinct**

   Because of ecological conditions during the glacial, few tigers could reach Borneo. Furthermore, the carrying capacity of forest on Borneo’s weathered substrate (MacKinnon et al. 1996) is generally less than on the rich volcanic soils of Java and Sumatra. Animal densities are therefore lower in Borneo, potentially supporting lower tiger densities (e.g. Rijksen and Meijaard 1999). It could thus be
relatively easier to hunt a species to extinction in Borneo than in other areas, especially if most of the indigenous population hunted wildlife. Also, the great cultural importance of tigers in Borneo could suggest that the species would once have been heavily pursued by human hunters.

3. Tigers still occur naturally on Borneo

A very small possibility, but one that cannot be entirely ruled out. As opposed to the theory above, one could reason that a tiger population that occurs naturally at low densities, as it did in Borneo, might be better able to cope with dispersed individuals than a naturally high-density population artificially low densities. Also hunting pressure on very dispersed animals may be low because the effort required to find a tiger would outweigh the potential profit. Therefore, a very low-density population in Borneo may have had a better chance to survive than elsewhere.

4. Tigers were once introduced to Borneo and established a wild-living population, which either survived or died out

As far as I am aware there is no historic documentation of tigers being introduced to Borneo, and I appeal to readers for any information on this.

Conclusion

Proving that a species is present is relatively straightforward, but finding proof that it has become extinct or locally absent is very difficult. At least a few times per year Indonesian newspapers still report on new observations of the now thought to be extinct Javan tiger (P. t. sondaica) in one of the most densely populated areas of the world. Luckily for the tiger there is no known historical presence on Borneo. I say ‘luckily’, because, ironically, if we assume that there is a remote chance of tigers surviving on Borneo, it may be the least threatened population of all, as few would be specifically pursuing them for their prized parts.

The question of what to do with the above tiger reports remains. If the scientific world is interested in finding out more, systematic interviews with indigenous hunters combined with camera trapping may be the best way to test whether tigers still occur. Camera trapping would be very useful because it would not only target tigers but also come up with information on a whole range of other little known Bornean species. Clearly positive results from camera trapping would still not tell whether tigers occur naturally or were introduced. Because two reports of tigers refer to a brown, faintly striped animal, it would be useful to ask informants how the Bornean tiger compares to the Sumatran tiger. Finally, an alternative approach, of course, would be to leave the image of the Bornean tiger intact in the mists of mythology.

Acknowledgements

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References


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Note: Several authors have referred to a “Bornean” tiger skull at the Natural History Museum (NHM) in London. Gray (1862, 1867, 1874 in Brongersma 1935) probably first mentioned the Bornean skull. Pocock (1929) reports on the record of an old skull, labelled “Borneo”, in the British Museum. Medway (1977: p. 146) mentions a tiger skull registered at the BMNH in 1859 as ‘Purchased’, with the locality “Borneo”. Medway quotes the documentation as saying: “...This skull, attributed to Wallace on the label, is one of a small group of accessions simultaneously registered at the BMNH in 1859 as ‘Purchased’, with the locality “Borneo”. Among other items in the group are a skull of Rhinoceros sondaicus (q.v. above), two skulls and some teeth of Babirussa and the skull of a tiger. There have been no subsequent authenticated records of any of the mammals, nor of Sus verrucosus, in Borneo, and the locality is evidently erroneous”. A. Kitchener (in litt. 6 May 1999) referring to Medway (1964) mentions a Bornean tiger skull from the Warwick collection, while C. Smeenk (Curator Mammal Collection Leiden Museum, in litt. 8 June 1995), referring to Gray’s catalogue of 1862, stated that the skull was in the Wright collection at the NHM. Interestingly, D. Hills of the NHM’s mammal section, reports that there are no tiger skulls from Borneo and to her best knowledge none marked “Borneo” in the collection (D. Hills, in litt. 6 May 1999). This example shows the difficulty of delving into the history of such matters.

Colorado Lynx Reintroduction Sparks Controversy

Controversy has arisen in Colorado over a project to reintroduce Canada lynx Lynx canadensis to the state. Arsonists set fire to the major ski resort of Vail to defend lynx habitat; landowners have gone to court to stop the project; some reintroduced lynx have starved to death; and the authorities are planning to release more lynx and see if some of them starve too. If half do, then the project may be called off.

While the justification for the project was that the lynx had been exterminated in the state, a park ranger recently reported a sighting in an area distant from the reintroduction project.

The US$1.4 million reintroduction project made big headlines last year when arsonists caused damage to the Vail ski resort, assessed, according to press reports, at $12 million. An underground group, the Earth Liberation Front, claimed responsibility. The last lynx sighting had been in 1973 in the Vail region, west of Denver, and it was to have been the reintroduction site. Vail authorities, who were planning an expansion of the skiing area, put up $200,000 for the project.

In the event, another area was chosen – private land at around 3,000 metres near the San Juan mountains in the south-west of Colorado. The timing was decided on because the lynx’s main prey, the snowshoe hare Lepus americanus, is currently at the peak of its strongly-fluctuating population cycle, and the lynx population reflects that cycle.

Two female lynx, trapped in British Columbia, were released on 3 February, with the aim to introduce 110 cats in next two years. Of 13 cats released in February and March four died of starvation, and another was recovered in an emaciated condition.

The project’s lead biologist, John Seidel, who has now retired, was reported to have said that it was expected that half the lynx would die, but from being hit by cars or killed by other predators, not from starvation. Now 30 lynx from Canada and Alaska are being “fattened up” for release. If half of them die, the project will be halted.

“We don’t want to rule out continuing the project at a later date, but if we have that kind of mortality we would recommend against going forward next winter,” said Todd Malmsbury on behalf of the Colorado Division of Wildlife. Rick Kahn, wildlife management supervisor for the division said: “We think there is a reasonable chance of success, but we won’t have proof until around the end of August. After that we’ll decide whether to continue with more releases next year.”

The Canada lynx, which weighs around 10 kg, half that of its Eurasian cousin, is common across Canada, but the USA represents the southern fringe of its range. Although formerly widely distributed in 16 States, its existence now is confirmed only in the northern States of Washington, Montana, Maine and, possibly, Minnesota.

Landowners in Colorado oppose the reintroduction project because they fear that it will lead to grazing restrictions. “I don’t know that we have any objection to the lynx,” said one rancher. “It’s just if the lynx do well there, these people are going to say this is good lynx habitat and then maybe close it off for cattle.”

Their case has been taken up by the Mountain States Legal Foundation on behalf of the Colorado Farm Bureau, the Colorado Cattlemen’s Association, the Colorado Outfitters’ Association, and the Colorado Wool Growers’ Association. The fear is that if, as scheduled, the Canada lynx is added to the US Endangered Species List, federal regulations and prohibitions on habitat would come into force. However, it would be possible, if the reintroduction were successful, for the US Fish and Wildlife Service to allow Colorado to maintain control.

The suit charges that the wildlife division failed to perform all the environmental impact statements required under federal law. If the case is successful, the lynx may have to be removed, according to one of the attorneys. At a hearing in December a District Court Judge refused to halt the reintroduction, and the case has gone to appeal.

(Oldo Fish and Game Director Steve Mealey has rejected a proposal to reintroduce the lynx in northern Idaho because he feared lynx protection would dilute state control over hunting and trapping.)

New York Times writer Mark Derr said the area chosen was at the southern end of lynx range, where the snowshoe hare population was uncertain, and, by most accounts, lynx were never abundant there. The reintroduced lynx were being brought from hare-rich country and expected not only to learn to hunt different prey, such as marmots Marmota flaviventris and grouse (Tetraonidae), but also compete with bobcats Lynx rufus, mountain lions Puma concolor and coyotes Canis latrans.

As controversy raged came a report by Park Service Ranger Jim Detterline that he saw a lynx in Rocky Mountain National Park, said to be the first credible sighting in a quarter of a century. He said he watched it for about a minute, and described the cat’s high haunches and large feet, distinctive characteristics of the Canada lynx. The park is distant from the present release site.

In 1988-90, 83 lynx were released in the Adirondacks, New York State, in an attempt to restore a vanished population. Of the lynx, 32 were known to have died, including 12
killed by vehicles, the main cause of mortality. Five died out of state, usually by shooting, and three were shot in NY State for raiding livestock pens. In 1992, the biologists involved, Rainer H. Brocke and Kent A. Gustafson of the College of Environmental Science and Forestry, State University of New York, said that the public had reported 334 lynx sightings, but perhaps only one-third were valid.

**Missing Lynx No Longer Missing in the Oregon Cascades**

US Federal biologists say there is evidence that the Canada lynx, believed extinct in western Oregon, is living in the Oregon Cascades. Evidence has been found at five locations in the Willamette, Mount Hood and Deschutes national forests. This could force federal officials to further restrict logging, road building and other activities if, as expected, the lynx is put on the nation’s list of endangered species later this year. The US Fish and Wildlife Service has proposed listing the lynx and is trying to determine its range.

Until surveys in August, the Fish and Wildlife Service believed that the only ones left were in Maine, Montana, Washington and possibly Minnesota. Last summer, biologists fixed carpet remnants on trees or logs high in the Cascades, then sprayed a chemical attractant on or near the carpet. The lynx would rub against the carpet, which had small nails sticking out to catch the cats’ fur. Laboratory tests of hair confirmed the presence of lynx.

The last confirmed sighting in western Oregon was about 25 years ago in the Corvallis area. There have been at least three sightings in eastern Oregon since 1990. Environmentalists said the rediscovery of the Canada lynx strengthens their case that logging, road building and snowmobiling should be further curtailed in the national forests of the Cascades.

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**Lynx Management Problems in the Swiss Alps**


Lynx (*Lynx lynx*) were re-introduced in the Swiss Alps and in the Jura Mountains in the 1970s. Since then, two populations have developed and spread over part of the potential range. However, the expansion ceased in the mid-1980s, and some peripheral areas once occupied are deserted again (Breitenmoser *et al.* 1998). The reasons for this are unclear, but most likely, it was due to a natural decrease of lynx density as prey animals have re-adapted to the predator's presence, and – maybe more important – to illegal killing of lynx. Since about 1993/94, a renewed increase in the lynx population in the north-western Swiss Alps has been observed, leading again to a grim controversy about the return of the large cat. Not only hunters and sheep-breeders, but also the authorities of the respective cantons, have demanded the reduction of the lynx population in this area. To respond to this situation, a research project was started in the north-western Swiss Alps, and a Lynx Management Plan for Switzerland should be implemented soon.

**A trouble-shooting project**

The monitoring of lynx in Switzerland is based on three sets of data (Capt *et al.* 1998): (1) Registered mortality of lynx, (2) verified cases of depredation, and (3) periodic inquiries among game wardens. After the lynx population in the Swiss Alps had been stable or decreasing for almost 10 years, the 1994 survey indicated for the first time an increasing lynx abundance in the north-western Alps. At present, lynx distribution in the Swiss Alps is distorted (Figure 1): There is a high lynx abundance in the north-western Swiss Alps; a moderate presence in the central and south-western parts, and no lynx in the eastern Alps of Switzerland. When in 1996 the increasing number of cases of predation in the north-western Alps (Figure 2) caused a controversy between sheep breeders and the local wildlife management authorities, the Federal Office of Environment, Forests and Landscape (FOEFL), together with the cantons of Bern, Fribourg, and Vaud, decided to start a project to evaluate the importance of the predation.

We were instructed to start a local project in the area where predation on sheep had been frequent. We sought to put radio-collars on lynx in order to investigate whether those killing sheep were "specialists", and how they could be prevented from doing so. We ordered four radio-collars and started trapping in January 1997. By April, however, we had already caught 15 lynx, in an area from the lake of Geneva to the lake of Thun (Ryser 1998, KORA unpubl. data). What was meant to be a small-scale project immediately triggered a controversy and political interest showing the urgent need to expand both the research area and the research topic. Since then, we have radio-tagged a total of 36 lynx throughout the north-western Alps. At present, 20 animals are still under telemetric surveillance. The objectives of the project are now:

- to survey the development of the lynx population by comparing the land tenure system of the local lynx with the radiotelemetric study done in the same area in the 1980s (Haller & Breitenmoser 1986, Breitenmoser & Haller 1987); and to study dispersal and possible migration corridors in the light of the skewed distribution of the lynx in the Alps
- to investigate the impact of lynx, not only on domestic stock, but also on wildlife (roe deer and chamois) in order to recommend management strategies for the hunting of the ungulate populations and the maintenance of the lynx population
- to inform the public in the study area, but also in the whole of Switzerland, about the situation of the lynx, and to evaluate possibilities to involve local interest groups into the discussion about future lynx management.

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Preliminary results have shown that lynx abundance in the north-western Alps is relatively high compared to earlier studies in Switzerland. The home-range sizes of the best surveyed male lynx so far were 92–207 km² (median = 151 km², n = 7), and of females 59–166 km² (median = 89 km², n = 9; KORA unpubl. data). These home ranges are smaller than those observed in the northern Alps in the 1980s (Haller & Breitenmoser 1986), obviously leading to a higher lynx density. However, the most remarkable change was that rather open, sub-alpine habitat, not considered to be good lynx habitat in the 1980s (Haller & Breitenmoser 1986), is now permanently occupied by resident lynx (Ryser 1998). The impact of lynx on the prey population must have considerably increased since the study of Breitenmoser & Haller (1987), given the fact that the predator’s abundance has increased.

Hunters claim that the roe deer population has been substantially reduced in the area. This view is partly confirmed through the game management units’ statistics, but the official roe deer census is controversial, and the ongoing research project has not yet produced reliable data in regard to predation. Some lynx seem to prey mainly on sheep during the summer. Sheep, grazing unattended on summer pastures, are easy prey to lynx. Nevertheless, lynx tend to hunt wild ungulates as long as these are readily available. Two lynx which have specialised in killing sheep have been shot so far with the permission of the FOEFL.

Waiting for the lynx management plan

Lynx (as wolf, brown bear and some other species listed in the Federal law) are strictly protected in Switzerland. Unlike with other protected carnivores and birds of prey, the cantons – which are primarily in charge of wildlife management – are not even allowed to remove specimens causing damage without the permission from the FOEFL. The FOEFL, on the other hand, is obliged through a Federal ordinance to prepare management plans for all species in this special list. To do so, the FOEFL has established a national board for the management of large carnivores. The committee incorporates members from the hunter’s association, sheep-breeders, conservation agencies, two cantons, the Federal agricultural authorities, and three experts (from Switzerland and neighbouring France and Italy).

The first draft of a Lynx Management Plan was disputed and revised by the board in 1998. The plan covers many aspects in regard to lynx conservation and management, but the main matter of discussion was on the possibilities of future control of the lynx population. The suggestion was a two-phase strategy: First, the irregular distribution of lynx should be levelled out through translocations from the north-western Alps to other suitable habitats. This would allow the local reduction of surplus lynx and accelerate the desired spread of the population. Then, if the suitable habit in Switzerland were occupied and the population could be considered viable, Federal legislation would be adjusted to give the cantons (or specific local boards) the right to intervene when they felt that lynx density in their region was too high. Such a strategy would guarantee that the lynx could settle all suitable habitats and survive there in the long run, but also respect the needs and the opinion of local people who are not in favour of the presence or the return of the large carnivore. The management plan will now go to all Swiss cantons, the relevant NGOs, and the general public for consideration. Only if the cantons – which in turn depend on the opinion of local interest groups –
approve this management plan will it have a chance of solving the lynx problem, if and when it is implemented.

A race against time...

In the meantime, tension in the north-western Alps is growing. In spite of the fact that the roe deer population had decreased over the past few years, there is so far no numerical response in the lynx, as we had expected from earlier experience. Last year’s reproduction was good — several females had three cubs — and the survival of the young lynx so far was remarkable; at least eight out of 10 kittens tagged in 1998 have survived the winter. The Alps has just experienced a severe winter, with amounts of snow rarely seen before. Such conditions are a calamity for the roe deer, but favour the lynx. The roe deer often kept close to the feeding stations maintained by the hunters, where they became easy prey to the lynx. In one case, a hunter described in an emotional letter to a local newspaper how he found three roe deer killed at one site. Of course, the feeding stations favoured the lynx’ ability to make surplus killings. But hunters in the Swiss Alps, where large predators were absent for a long time, feel and act like farmers: they feel bound to help the animals through the hardships of winter.

Now, in spring, roe deer are less vulnerable. Immediately, some lynx went for the few sheep already on the pastures. One angry farmer who suffered losses, refused to apply any of the preventive measures proposed. He would rather lose his sheep than do anything that could make him look willing to co-exist with the predator. Hunters and sheep breeders in the north-western Alps have openly stated that they will take the problem “in their own hands”, if no steps to reduce the local lynx population are taken soon. Given the vulnerability of lynx to illegal shooting, this threat must be taken seriously.

A positive response to the draft management plan for the lynx in Switzerland from the cantons and the public would help to calm the situation and — hopefully — could open the door to a new form of co-operation in large carnivore management in Switzerland, which needs, above all, public involvement. After almost 30 years of experience with the re-introduction of lynx in Switzerland and the lasting controversy it has set off (see Note), it would not only be wise, but urgently needed, to find ways to get local interest groups, such as hunters or sheep breeders, involved. Regardless of strict legal protection, lynx will never be able to survive in a densely settled area like the Swiss Alps if the local people oppose its preservation.

1999 Norwegian Lynx Hunt Results

A total of 88 lynx were shot and three were run over by cars during this year's hunting season from 1 February to 31 March.

The quota set by the government was 137 for the regions of the country where quota harvest is allowed. In these areas 84 lynx were shot. In addition there are areas where there is no restriction, but only four were shot there.

The county by county distribution was (quota in brackets) Finnmark 1(3), Troms 0(12), Nordland 12(22), North Tjendelag 14(16), South Tjendelag 0(1), Hedmark 15(21), Telemark 10(17), Aust Agder 4(8), Oppland 14(14), Buskerud 7(8), Møre & Romsdal 0(3), Oslo/Akershus 8(9), Østfold 2(3), Vest Agder 4 (open hunting).

This is a reduction from the high of 117 shot in 1998, but is back to the level of 1997 (95) and 1996 (85). Failure to fill the quota in several counties is probably due to many factors, such as variable snow conditions, lack of hunter interest, constraints imposed by county sub-division of the quota, and possible changes in the number of lynx in some counties.

The effect hunting is having on the lynx population is not known. A national monitoring program for all large carnivores is being introduced, which, as well as improving future estimates, will compile those of earlier years. This should allow an evaluation of the effects of harvest.

Lynx are widespread throughout Norway, except for the southwest, and population estimates for the winter of 1996-97 of 300-600 animals are probably reasonable.

1999 Norweign Lynx Hunt Results

References


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Note: One day’s letters in the Lausanne newspaper 24 Heures, 1 March 1999.

“Fifty lynx eat about 3,500 roe deer a year, and the wolf double that. In the mid-term, that is all the wild animals visible — ibex, roe deer, red deer, chamois and capercaille — which will disappear for the benefit of two animals one virtually never sees. If these two predators disappeared, it was not without reason. The team of biologists who have been studying the lynx since 1971 have cost the taxpayer tens of millions of francs. It is surprising that everybody is interested in reintroduction of charismatic animals, such as lynx, wolf and bear, but no one bothers to reintroduce pheasants, partridges and hares, which do less damage. It is not acceptable that the government cuts social subventions for people in need while wasting money for the sole pleasure of a minority of ecologists.”

“Where does this fear of the evil wolf and its acolyte, the lynx, come from? On the other hand, the gun symbolizes man, the sheriff. This mixture of power and fear bids to exterminate all wild animals under various pretexts. Is one not shocked by this odious settling of accounts with the last wild animals of Europe? When shall we remove the right to carry arms from those who would shoot everything that moves?”

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Eurasian Lynx in Norway
The realities of managing a large carnivore in a multi-use landscape
by John D. C. Linnell, Reidar Andersen and Tor Kvam*

When conservation succeeds, and populations of large carnivores increase in number and range, the real challenges begin. Managing carnivore populations in the real world where conflicts dominate often creates controversy. In this article we outline the issues currently facing Eurasian lynx in Norway.

A war of words
In the last couple of years there has been some concern expressed about the fate of lynx (Lynx lynx) in Norway in the international conservation media. This has been paralleled by a very intense verbal war in the national media. The cause of this discussion lies with the size of the annual hunting quota for lynx. This verbal war generally has four sides to it, represented by conservation groups, hunters, sheep farmers, and wildlife managers. Before looking at the arguments of the various groups we will present a little background.

A history of lynx and their management in Norway
Back in 1846, the Norwegian state began paying bounties for all mammalian carnivores (including lynx), birds of prey and other “pests”. Such a system was standard practice in Europe and simply reflected the different values that people attached to wildlife in the past. An annual average of over 100 bounties were paid for lynx up until 1980 when the bounty was removed. However, there was no further regulation of harvest, beyond setting broad limits to the hunting season, until 1992. After a short period of protection, a quota system was introduced in 1994 to regulate the annual hunt within a two-month season. Harvests are presently over 100 individuals per year.

During the mid 20th century, the bounty-motivated hunting reduced lynx to a few very small relict populations in central and southeastern Norway. Today, due to the removal of the bounty, possible immigration from Sweden, and an improved prey base, lynx are widespread throughout the entire country except for the southwest, and population estimates for the winter of 1996-97 of 500-600 animals are probably reasonable.

Two government policy decisions (1991 & 1996) have been made which confirm the national objective that lynx should be maintained in viable populations in Norway, except in the southwest where the potential conflict with sheep farming has been judged as too high. At the same time, the policy states that the interests of livestock farmers and hunters need to be taken into account. It is this balancing act which stirs the present controversy. As the national parks and nature reserves in Norway only contain enough forest for a few individual lynx (densities are typically less than one lynx per 200 km²), maintenance of lynx populations must occur in the often privately owned expanses of intensively utilised boreal forest. These areas offer many tens of thousands of square kilometers of good quality habitat with a good prey base for lynx, but it is here that conflicts occur.

Conflicts on an unprecedented scale
Grazing of domestic sheep, semi-domestic reindeer and hunting of game species like roe deer Capreolus capreolus are the three activities at the center of conflicts with lynx. Over two million domestic sheep are grazed in the forests and mountains during summer, without the protective presence of a shepherd or dogs. Losses to predators have been carefully investigated and confirmed to be very high, with 9,862 sheep compensated as being killed by lynx in 1996 alone. Losses of livestock to lynx on this scale are unknown on a European or North American scale, and are probably due to the low-supervision grazing system in forested habitats. Semi-domestic reindeer are also grazed year around in forests and mountains by the Saami ethnic group of central and northern Scandinavia. Although there is some basic control over the flocks’ general movement, this does little to discourage predation. In 1995-96, 1,768 were compensated as being killed by lynx, but this is widely regarded as being an underestimate of the true extent of the problem. Hunting game for meat and recreation is a way of life for Norwegians, more so than for many other European countries, and is accepted by the vast majority of the public. The sale of licenses can also make a significant contribution to rural economics. Therefore there is widespread concern for the possible impact that increasing lynx populations may have on roe deer (the main prey of lynx). A smaller, but increasing, number of hunters see lynx as an interesting huntable species in its own right. Most of the organisations that represent sheep farmers, reindeer herders and hunters are often vocal in their demands that lynx populations should not be allowed to increase beyond their present levels, and indeed there are many calls for widespread reduction of lynx populations to a much lower level. In other words, these groups call for increased hunting quotas, often claiming that the populations are grossly underestimated by managers and scientists.

Scientific background for management
For there to be any chance of establishing a defendable management structure, there needs to be a firm scientific base. During the 1980s there was virtually no scientific data available, from either Scandinavia or Europe as a whole. Data on the related Canada lynx Lynx canadensis was often mistakenly transferred. Although a member of the same genus, Eurasian lynx have a totally different ecology, being much more similar to pumas Puma concolor, or indeed leopards Panthera pardus, in terms of the sizes of their home ranges and ungulate based diets. Thankfully, the situation has now changed. As well as large amounts of data emerging from studies in Poland and Switzerland, there have been four telemetry-based studies of lynx ecology in Scandinavia, three of which are still going on (see related article below). The result has been a dramatic increase in our understanding of lynx ranging behaviour and diet. These studies have greatly improved the scientific foundation for management, but there is a crucial delay before information can be transferred from research reports to use. For our data to be accepted by all sides it has

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become critical for scientists to be neutral as regards choice of management goals in these debates.

Can a balance be struck?

The challenge for wildlife managers is to utilise the available data to manage lynx populations in a manner which maintains viable populations, provides hunting opportunities and minimises conflicts. The present debate clearly reveals that this balance has not yet been achieved. In an attempt to increase local input into management an experimental approach is being tested in two counties where committees composed of local interest groups can set the hunting quotas. Although the need to increase local involvement in management is vital, it is not clear if these committees in their present form are compatible with lynx conservation. Certainly, there is a need for an increase in the scientific basis to the decision-making process, a reduction in political involvement in management, and continued monitoring of the effects of present harvests.

However, a true grass-roots commitment to maintaining lynx populations will only come if ways can be found to reduce conflicts. So far there have been few initiatives from the agricultural authorities to improve sheep husbandry through the use of shepherds, guarding dogs, or fencing of sheep into more easily protected pastures, or changing to beef cattle production. Although such changes in husbandry are expensive, they will also help protect sheep against other carnivores like wolves, bears and wolverines which cause additional depredation. However, the one absolute that limits all potential management is the biology of the lynx.

When compared to continental Europe the ecological potential for lynx (and other large carnivores) is superb throughout much of Norway, due to extensive forest cover, a low human density, and a good prey base. The scientific basis for proper management is rapidly being acquired. However, overcoming conflicts and traditional prejudice will require co-ordination between wildlife and agricultural departments, extensive information campaigns, and a clear message from the public that they support lynx conservation. Extreme polarisation of viewpoint helps nobody. Therefore the debate should not be about “should we hunt lynx or not” but “how to set scientifically defendable quotas which satisfy diverse (but not necessarily mutually exclusive) objectives”.

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Lynx Research in Scandinavia

by John D. C. Linnell* & Henrik Andrén**

When it is considered that the majority of western Europe’s lynx are found in Scandinavia, it is very surprising how little has been published from the region. Classic snow-tracking studies from the 1960’s have long been the main source of ecological data. In contrast, studies conducted on the reintroduced populations in Switzerland, and the small population in the Białowieza forest in Poland have produced a wealth of publications during the last decade. Thankfully, this situation is about to change.

Table 1. Details of the four lynx projects currently underway in Scandinavia. The main prey species in each study area is marked with an asterisk

<table>
<thead>
<tr>
<th>Location</th>
<th>Norway</th>
<th>Sweden</th>
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The expansion of lynx populations during the last 10-15 years has sparked a debate about their management in Scandinavia (see related article above). As knowledge levels were insufficient to provide a foundation for management, the last five years have seen the initiation of four field projects (two in Norway, two in Sweden) spread across the Scandinavian peninsula. The four study sites differ greatly in topography and prey base (Table 1). Although the projects are run by three teams based at two institutes, they are all organised under a common umbrella, Annual meetings, and cooperation with data analysis and field work ensure a good level of contact.

The projects have so far been a success in terms of the number of animals captured and radio-collared. Capture techniques used have included darting from helicopters (Sarek only), snares placed around kills, walk-through box-traps, the use of trained dogs to tree lynx, and implanting transmitters in neonatal lynx kittens. The use of helicopters (in Sarek) and dogs (Hedmark and Bergslagen) has been especially useful to recapture individuals, allowing us to maintain contact. Some individuals have been constantly followed for over five years. Study topics have included home range, social organisation, dispersal, diet, and predation rates. Parallel studies of radio-collared roe deer Cervus capreolus (the main prey) are ongoing in the Hedmark and Bergslagen study sites. Predation on domestic sheep and semi-domestic reindeer have received much focus in the two Norwegian
sites, and to a lesser extent in Sarek in Sweden, because of the conflicts associated with lynx and the livestock industry.

Results so far have been in general accordance with studies from continental Europe, apart from three important ways:

1. The scale of movements is very large. For example, in Hedmark, male and female annual home ranges averaged 1,400 and 830 km² respectively. Dispersal distances are also very long: one male moved 400 km in nine months when he travelled from the Sarek study site to the Nord-Trøndelag site. Similarly two young males have dispersed from the Hedmark study site, and joined the Bergslagen study (almost 200 km).
2. Domestic livestock are killed with relatively high frequency, leading to very big conflicts.
3. Even when roe deer occur at very low density, the lynx have shown themselves to be very effective at finding and killing them.

After several intensive years of field work, we have just begun the first round of analysis, and started the writing stage. Field activity will continue in three of the sites, with the aim of improving the precision of our estimates of demographic parameters. We shall keep readers of Cat News informed of further developments as they come.

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**Leopard in the Arabian Peninsula**

*by Isabelle and Jean-François Lagrot*

Very little is known about the Arabian leopard *Panthera pardus nimr*. While carrying out research for a French TV film about the status of the Arabian leopard in the Arabian Peninsula, we were able to collect some information during a two-month period, between the 15 February and 15 April, 1999. Our investigation started in the United Arab Emirates (UAE) in the Sharjah Emirate, where we met Dr Marijke Jongbloed, who founded the Arabian Leopard Trust (ALT). The ALT supports a field worker in the Musandam Peninsula, a narrow stretch of land by the Strait of Hormuz. According to Moaz, the field worker, a few leopards may remain in this area, probably the last remaining in the UAE, and certainly fewer than 10 individuals.

As far as we know, there are no Arabian leopards in captivity outside the Arabian Peninsula. The only captive leopards in the UAE are kept at the Sharjah Breeding Center. Marijke Jongbloed informed us that there are currently six leopards at the Center; one wild male from UAE, one wild male from Yemen, one male born at the Center last August, one wild female from Oman, one female born in captivity in Oman, and one new-born cub. Throughout the Peninsula there are about 20 Arabian leopards in captivity.

In Yemen, there are currently four leopards in captivity. Three are at the Taizz Zoo, five hours drive south of Sana’a. Two are males (the oldest has a cataract on one eye) and one is a female. Two were a recent gift by the Yemeni president: they had previously been offered to the president by a dealer, who bought them from a Wa’ada tracker (see below). Presently all three are held in the same cage, but they will be separated soon, as the veterinarian at the zoo intends to breed them. The fourth leopard, a male of about 10 years of age and weighing 30 kg, was captured recently, also in the Wa’ada Valley, which is situated 2.5 hours drive north of Sana’a. This individual is kept in a cage in a private zoo close to Sana’a airport, where people pay a few Yemeni riyals to view it. We learnt about this animal when a Saudi team came to check its health, and ascertain its sex: if it had been a female they would have been interested in acquiring it.

The Wa’ada region (approx. 20km x 30km), where leopards have been caught for some years, includes a very desolate, dry, rocky mountain, and two wadis several kilometres apart. According to the local sheikh, 10 leopards have been caught by trappers in the last 10 years: nine males and one female. One of them was found dead in the stone trap. The traps look like stone igloos, 120 cm high, 200 cm long, with a small entrance at one end, and a long flat stone suspended above the entrance by a rope, which is attached at the other end to a piece of meat, inside of, and at the far end of the trap. When the leopard grabs the piece of meat, it loosens the rope, causing the flat stone to fall down, thus trapping the leopard inside. In some cases the trap is operated by a man, hidden about 30 m away, who holds the rope and closes the trap when the leopard enters. We had seen similar traps in the Musandam Peninsula (UAE) (and another identical but smaller trap for foxes *Canis* spp.), and we were told that they also exist in Saudi Arabia. At the time of our visit, eight traps were in operation.

Striped hyenas *Hyaena hyaena* and caracal *Caracal caracal* are also regularly caught in the traps. Some of them end their lives in appalling conditions in private zoos in Yemen, where people can view them for a few riyals, or they are sold in wild animal markets, such as the one that takes place every Thursday morning on the Yemeni-Saudi border. The traps are built at the top of a cliff, above and along the wadi, and close to the inhabited area of the wadi, probably because leopards come close to human settlements in order to feed on goats.

We found recent signs of leopard presence, such as droppings containing goat hairs. We also found a leopard skull in a cave. On the plateau next to the cliff is a rock formation provides ideal habitat for the Arabian leopard, with small shady caves linked to each other.

According to the sheikh and the trappers we spoke with, leopard hunting is not a traditional activity. Previously, leopards were trapped to protect goats, when an individual was known to attack domestic livestock in the area. It was killed inside the trap, the fur was sold, as well as the fat — which was used in traditional medicine — in Saudi Arabia, people can earn up to 10,000 saudi riyals (US$2,800) from a dead leopard by selling.
the different components. Some individuals have begun to be sold for display in cages in Yemeni villages. It was only recently, in response to the activities of different conservation programmes and newspaper articles describing the rarity of this predator, that a market appeared, with huge amounts of money to be earned! A trapper currently sells a leopard for $4,000-5,000 to a dealer, who subsequently sells it at a much higher price. However, trappers (and virtually anyone can set up traps, as it requires little skill) do not trap all year long because of the cost of the goats used as bait.

At the National Wildlife Research Center (NWRC) at Taif, Saudi Arabia, there are two males that seem to be younger than the ones held at the Taizz Zoo. The first one was acquired by the Center in July 1997, and is estimated to be four years old, and the second, which is slightly older, was acquired in June 1998. The coat colour of the first one is more yellow and darker than that of the second, which is paler, almost black and white. Both are very shy. The first one ventures out only in the late afternoon, jumping on top of its box. The second spends the entire day inside the box, coming out only to grab food, or at night. One was purchased, and is supposed to have been caught in Saudi Arabia, although it might in fact have been caught in Yemen, most likely in Wa'ada. The other leopard came from the Saudi-Yemeni border market, and also probably comes from Wa'ada. Both weigh between 20 and 25kg.

During the last few years, Patrick Paillat of the NWRC has been investigating and interviewing people along the 400km Sarawat-Asir escarpment, which is known to be one of the last habitats of the Arabian leopard in Saudi Arabia. There is another isolated population close to Medina. The escarpment drops from a height of more than 2,000 m a.s.l. down to 600 m a.s.l. in a steep rocky slope shaded by sparse juniper forest.

The part of the escarpment believed to shelter leopards runs from Al Bahah to Abha, approximately 350km in length. In some areas there are large colonies of hamadryas baboons Papio hamadryas, whose young may be occasional prey for the leopards. Signs of the presence of leopards are found mainly halfway up the escarpment, as the animals appear to avoid the inhabited areas on the plateau on the top of the escarpment, and on the plain at the bottom. It is also at this altitude (approx. 1,500 m a.s.l.) that a communicating network of coves can be found under the huge rocks fallen from the cliff, or carried by the wadi while in flood. We explored these caves and found bones and blood of hyrax Procavia spp. goat bones, leopard footprints, a claw and dropings.

According to Paillat, the Saudi population numbers no more than 50 individuals. Sightings and reports from local people are not rare, but different sightings may be of the same animal, as the leopards are likely to move large distances along the escarpment in search of prey. By interviewing people, we learnt that a leopard had been seen a week before our arrival in an area known by people as a leopard area. We were shown a stuffed animal that was said to have attacked a hunter. Not far away, an apairist told us he had seen a female with two cubs two years ago.

The three main threats to the leopard in Saudi Arabia seem to be:

1. intensive hunting of hyrax, which is the leopards' main prey
2. fragmentation of the escarpment into isolated patches, due to the building of new roads
3. the continual encroachment of human settlements into leopard territories, and as a consequence, leopards being killed because of their habit of feeding on goats, or encountering hyrax hunters.

Some research is underway on the Omani leopard population in the Dhofar area, to the south, close to the Yemeni border.

Scientists concerned with the status of the Arabian leopard estimate that the total population throughout the Peninsula does not exceed 200 individuals, and could be closer to 100 animals. There is no legal protection for the leopard in Saudi Arabia.

* Veterinarians, France

The Leopard in Armenia: Which Subspecies is it?

by Igor Khorozyan*

The leopard Panthera pardus is famous for having the widest distribution among all the wild cat species, but its subspecies-level taxonomy still remains uncertain throughout the range. Particularly, the leopards of Armenia and the whole Caucasus, lying between the Caspian and Black Seas have been defined at different times as subspecies tulliana, ciscaucasica, saxicolor, dathei and transcaucasica. The last name is artificial and out of use in today's systematics, and the validity of the fourth is dubious, while tulliana, ciscaucasica and saxicolor fit the Armenian leopards most properly. But which one?

Recently, a study of leopard pelage kept at the Yerevan-based Institute of Zoology (two skins and three stuffed materials), and an analysis of the picture of a leopard skin harvested in southern Armenia (Zangezour ridge, Kapan district) in November 1997 were performed. These procedures have shown a similarity of local cats with those described for eastern Turkey, southern Turkmenistan and northern Iran as saxicolor. The features of saxicolor, defined by Borner (1977) and listed here, are found in the pelage studied: (1) coloration – creamy white or light yellow on the back and pure white on the belly; (2) rosettes – small, closely grouped together, rows of solid dots extending along the body from head to tail, except in the middle where the small rosettes of the flanks extend over the back; (3) tail – no thick furry tip; (4) tail length/body length ratio <1; and (5) hair length up to 7 cm on the belly.

The most eye-catching fact emerging from observation of Armenian leopard skins is their obvious similarity with snow leopard, supported by Alan Shoemaker's (pers.comm.) statement that they look like a live leopard seen by him in Kabul, Afghanistan, and that Afghan leopards have often been confused with snow leopards by
local people due to their light coloration and thick fur (Nowell and Jackson 1996). These data also tend to convince us of the common origin of the leopards from Armenia and northern Iran, where they have greyish rather than yellow or tawny fur colour observed elsewhere (Heptner and Sludskii 1972), as Armenia's Zangezour ridge may act as a corridor between local and Iranian leopard populations (Khorozyan 1999).

The present finding also corroborates a recently proposed idea that, given the absence of significant geographical barriers within the leopard range in southwest Asia (from Asia Minor and the Caucasus to the Arabian peninsula and Afghanistan), it is suggested that this region has been inhabited only by one subspecies, saxicolor, and any variations in morphological features or genetic structure between the separate subspecies occurring here (ciscaucasica, dathei, jarvisi, nimr, saxicolor, sindica and tuliana) may be attributed to the ecological flexibility of this species (Miththapala et al. 1996).

Armenian Leopard Conservation Society

The Armenian Leopard Conservation Society (ALCS) is a newly-established public, non-profit organization functioning with the single goal of saving local leopards of the North Persian subspecies Panthera pardus saxicolor from imminent extinction. It unifies professionals from different scientific entities (Center for Ecological and Noosphere Studies, Institute of Zoology, Ministry of Environment and the Khosrov Reserve) working as volunteers for leopard ecology and conservation in the country.

In the period 1999-2004, the ALCS plans to pass through the following three stages before the establishment of a workable National Leopard Conservation Strategy (Leopard Conservation Assessment and Management Plan, CAMP) in Armenia:

- implementation of extensive field research, especially in Khosrov Reserve
- assessment of the potential for the development of in situ conservation, captive propagation and reintroduction programs
- initiation of public education campaigns, especially among urban children and youth and in local rural communities.

Currently, ALCS intends to prioritize just field research activities which would enable the collection of necessary material and to use this database for the development of national programmes on leopard in situ conservation policy making, captive breeding, reintroduction and public education. We also plan to produce a quarterly "Pardus Newsletter" for free distribution throughout Armenia, but primarily within the rural communities sharing their habitat with the leopards.

What has been completed and what is expected to be done in the near future?

All information, published or not, has been compiled on leopard status in Armenia and adjacent countries. All extant field data and findings gathered from museum-kept specimens have been processed and presented in several publications in English. They will all be available soon in the Cat Specialist Group Library.

Now it is necessary to clearly define how serious is the economic setback created by leopard predation on the livestock on Armenian farms which, in its turn, inclines rural dwellers to eliminate the cats, in spite of the stringent governmental measures of punishment. For this purpose we plan to begin a large-scale study, which would envisage scat analysis for prey spectrum identification. Collected fecal samples will be used also for a further 4-D study:

1. determination of wolf-bear-leopard feeding competition on domestic livestock, based on comparing the diets (prey residues in scats) of these predators within a common range;
2. determination of reproductive status of local leopard females, given the data on fecal steroid monitoring;
3. determination of the contamination level of the leopard faeces by harmful substances, e.g. heavy metals and pesticides, which is expected to be high; and
4. determination of spatial structure and size of the leopard population by means of mapping defecation site distribution pattern and scat freshness levels in each.

Anybody interested in fruitful partnership and/or willing to support our research endeavours, please do not hesitate to contact Igor Khorozyan, ALCS Chairman by email <eco@hragir.aua.am>. We cordially welcome any financial assistance and advice.

References


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Central Asian Republics’ Snow Leopard Conservation Strategy

Snow leopard specialists in Central Asia have agreed to collaborate in an action plan to save the snow leopard *Uncia uncia* in the region. Participants from Kazakhstan, Kyrgyzstan, Uzbekistan, Russia and USA gathered in Almaty to discuss preparation of a regional program for protection of the snow leopard in the mountains of Central Asia.

A regional (international) working group called “Asia-Irbis” (*irbis* is the local name of the snow leopard) was established to carry out the following actions:

- create a regional computer database
- carry out a joint survey on current status
- work out and implement standard methods for censuses, monitoring and treatment of data
- work out a regional strategy for conservation of the species and its habitat; and preparation and analyses of projects on Snow Leopard protection and monitoring
- make proposals for the optimization of the protected areas network in Central Asia
- organize a special training workshop, joint expeditions and meetings of specialists
- ensure the wide distribution of information on the activities of the working group to promote public awareness.

Participants at the workshop prepared an Appeal to the Governments of Kyrgyzstan, Kazakhstan, Tadjikistan and Uzbekistan Republics and Russia to provide urgent measures for snow leopard protection and to promote the initiative of the regional working group to save the species.

Elena Kreuzberg-Mukhina, Elena Bikova, Alexander Esetov of the Uzbekistan Zoological Society said in a report on the workshop that large-scale development of mountain territories in this century had led to declining ranges and numbers of many mountain species. Poaching and habitat transformation were the main causes which caused the extinction of the snow leopard in one region and the decrease in its number in others. They said the present status of the snow leopard in Central Asia gave rise to alarm about its survival in the current difficult socio-economic conditions.

Although the species is included in the Red Data Books of all Central Asian countries and Russia, and any legal persecution of Snow Leopard is strictly forbidden in all countries, the real threats to its survival increased after the collapse of the Soviet Union. Borders became more open; traders from China and other countries of Southeast Asia were sending orders for snow leopard parts (bones, skin, and internal organs) used in traditional Chinese medicine. Old forgotten customs in the mountain areas had been reborn. For example, in ancient times snow leopard skins were presented as tribute to dominant Kyrgyz and Kazakh tribal rulers. Now the custom has appeared again and subordinates give the skins of snow leopard to the local chiefs of regional administrations.

The report said that there were insufficient funds for forest managers to carry out their work and salaries of wardens were so small that many of them became the executors of orders and guides of poachers. Poaching has increased in many areas, and the price of snow leopard skins fluctuates from US$100 to $2,000 depending on quality and the level of the transaction. Other causes of snow leopard decline reflect the decrease in prey numbers.

After the collapse of the Soviet Union, the number of livestock belonging to collective-farmers in many mountain regions has fallen sharply. This has led to the improvement of natural pastures in high altitude meadows and a growing number of some mountain unguulates and marmots *Marmota* spp. But, as a result of the decrease in livestock numbers, poaching of wild animals has increased, and many local villagers hunt marmots, ibex *Capra ibex* and wild sheep *Ovis vignei* for food. These actions have led to halving the number of snow leopards, from about 2,000 at the end of the 1970s to about 1,000 animals or fewer, with negative current trends.

In several republics, projects for conservation of the snow leopard and other wildlife exist – WWF in the Altai mountains of Russia; German Association for the Protection of Nature (NABU) for establishment of special anti-poaching squads in Kyrgyzstan; and International Snow Leopard Trust for the analysis of the present status of the snow leopard and its prey in Gysyr nature reserve in Uzbekistan.

Spring 1999

Knitting for Snow Leopards

by Tom McCarthy and Priscilla Allen*

Herding families in Mongolia are busy this winter turning their camel, sheep and cashmere wool into gloves, hats, and scarves as part of a snow leopard *Uncia uncia* conservation project. The program is known as Irbis Enterprises (*irbis* being the Mongolian word for snow leopard), and aims to establish a much needed outlet for the semi-nomadic herder's livestock products, while providing a conservation benefit to wildlife.

As in other parts of their range, conflicts between snow leopards and humans in Mongolia present a serious conservation challenge. Poaching of cats occurs, and livestock grazing puts pressure on natural prey populations. On the other hand, snow leopards commonly prey on domestic stock and competition for grazing land is increasing. Over the course of our long-term research in Mongolia we have spent substantial time with herders who live in snow leopard habitat to better understand these issues, and to gain a perception of the herders' lives and needs. Assisting nomads to increase their household income while fostering local appreciation for nature conservation, snow leopards in particular, was the impetus for developing Irbis Enterprises.

In summer 1998 we initiated the program in two communities adjacent to large protected areas containing snow leopards. One was in Uvs Aimag in north-western Mongolia and the other in Gobi-Altai on the northern edge of the Great Gobi National Park and Biosphere Reserve. Community meetings were held near summer encampments to explain the program and determine interest and skill level of local participants. Park biologists explained the need to protect snow leopards, using examples of other large cats that are close to extinction because of human pressure. Irbis Enterprises was presented as a way for the Protected Areas and international conservation NGOs to help herders increase their household income in return for local help in protecting snow leopards. Samples of handicrafts were then purchased for market research in Ulaan Baatar, the capital.
The results of our marketing study were very positive, indicating that hand-crafted products with wildlife motifs, and sold as "Snow Leopard Friendly", would be popular among eco-aware tourists. We returned to the herding communities in autumn to set up cooperatives, order products, and establish a system for local management of collection and quality control. Herders were contracted to produce a total of nearly 2,000 items over the winter. Quality and style requirements were explained in detailed drawings. Local coordinators were selected from among the herding community.

Conservation linkage

Products will be collected from local sites in May and each family will be paid a base price for their goods. A bonus of 20% will be awarded in November of this year if all terms of the contract have been met. The bonus forms the most immediate link between income generation and wildlife conservation. The entire community will lose the bonus if any herder illegally kills a snow leopard, ibex *Capra ibex* or argali *Ovis vigneet*, thus individual incentive is enhanced by peer pressure. Individual producers will lose bonuses for other violations of national wildlife laws or grazing regulations in the Protected Area Buffer Zones. Compliance will be monitored by protected area rangers and biologists.

The project also offers less tangible but important conservation linkages. Because Irbis Enterprises is administered through the local Protected Area, it is fostering a positive perception of the reserves. Herders are also gaining a greater appreciation of the international interest in Mongolia's unique natural heritage, and of wildlife issues in general.

Self-sustaining

Irbis Enterprises aims to be entirely self-sustaining in the near term. Outside funds now cover initial set-up costs and seed money to buy the first year's products. While the majority of profits go directly to herders, all transport, marketing and internal salaries will be budgeted for from sales receipts. Already people with very specific responsibilities manage the project at the community level and a national coordinator is in training. The need for international involvement will be reduced as local stakeholders become increasingly aware of the potential benefits and improve output and efficiency from within.

Future expansion

Other protected areas and international conservation NGOs in Mongolia have expressed an interest in the Irbis Enterprises concept, indicating an opportunity exists for internal expansion. At the outset we determined that a strong demand for this type of hand-crafted "Snow Leopard Friendly" product also exists in western markets, making it potentially viable to pursue this concept internationally. Although during the pilot year we elected to sell only to tourists within Mongolia, we are now exploring possibilities on the international handicraft market, either by exporting to foreign retailers or by direct sales over the Internet. A project of this scale might require substantial initial input, yet the contribution towards conservation in Mongolia could be crucial to the sustainable development of ecosystems and the people within.

Acknowledgements

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**Andean Mountain Cats (Oreailurus jacobita) in Northern Chile**

by Jim Sanderson*

Andean mountain cat *Oreailurus jacobita* sightings are rare, with only three documented encounters published (Nowell and Jackson 1996, Grimwood 1969, Scrocchi and Halloy 1986, Ziesler 1992). Virtually nothing is known of its biology, ecology, or its importance to native people. Only recently has there been any genetic analysis and this was from 14 museum specimens (Johnson et al. 1998).

From October 26 to December 15, 1998, I surveyed and live-trapped for Andean mountain cats at Sala de Surire National Park near the Chilean/Bolivian border (18°51'S, 69°08'W, 4,280m). An active borax mine was operated in the Sala. According to my interviews with local native American Aymara llama and alpaca herders, only one old man could recall having seen the cat as many as four times in his lifetime. Most people have not seen cats in several years and indeed reported that, though three species of cats were once found in the area, only pumas were known to occur with certainty today.

My survey was based at Surire because a photo taken from the CONAF ranger station was confirmed to be an Andean mountain cat. I observed, photographed, and created a video tape of an Andean mountain cat adult male in excellent condition on three occasions, once for five hours and from as close as two metres. After 591 trap-days I failed to capture any cats, though I did succeed in capturing hog-nosed skunks *Conopatus chinga* on eight occasions and 16 mountain viscachas *Lagidium viscacia*. In addition, I photographed one stuffed Andean mountain cat and one skin, eight stuffed Pampas cats *Lynxchilinus colocolo*, and two pumas *Puma concolor* used by the Aymara in festivals. I obtained three of these specimens for the National Museum of Chile.

My observations confirm the three previously published reports that the Andean mountain cat seems without fear of people. Indeed, during video-taping from a distance of 10m he stretched, yawned, sprayed a rock and then slept for 12 minutes before resuming his search through a mountain viscacha colony.

The area around Surire is treeless up to 4,600m where gnarled trees appear sparsely. Spike grasses, a cactus, and thorny shrubs
are utilized by mountain viscachas for food and shield them from the midday sun. Four rodents are found in the area: mountain viscacha, tuco-tuco *Ctenomys opimus*, highland desert mouse *Eligmomotia typus*, and the Altiplano chinchilla mouse *Chinchillula sahamae*. In addition, Altiplano bird species, and at least one species of lizard, were present in the study area.

My observations contrast with those of previous reports regarding the size of mountain viscacha colonies. Mountain viscachas exhibit a crepuscular activity pattern (but this does not imply that Andean mountain cats are active only at dawn and dusk). They take shelter from intense solar heat during the midday hours in shade provided by plants and rocks. Hence, they are huntable, and the male I observed was intermittently active during the entire day. Furthermore, the mountain viscacha colony behind my living quarters contained more than 1,200 animals, a population estimated by three independent surveys I did two weeks apart. This is in contrast to Ziesler’s (1992) report of viscacha colonies being no larger than 60 animals. Water ran daily in a nearby bofedal, an area watered by surface flow, creating a green oasis in an otherwise brown environment save for the emerald green llereta *Laretia compacta*, a dense, cushion-like shrub. Adequate water and large food supply might indicate the cat was present or nearby most of the time.

I trapped over a wide region and in bofedals, areas of high viscacha densities; places where I found cat tracks; areas where spray marks were found; and places where cat observations had been made in the past, with a variety of fresh baits (chicken, alpaca, llama, fish and sheep) using camouflaged live traps. Furthermore, I changed bait about every three days and could observe traps from a distance with binoculars, thereby minimizing my contact with them. Bait froze at night and dried during the day, lessening its effectiveness as a scent attractant. I piled bait on rocks behind some traps. Save for the skunks, my bait attracted no birds of prey or terrestrial carnivores.

The adult male Andean mountain cat I observed was reminiscent of a guigna *Oncifelis guigna* I had radio-collared earlier in the year on Isla Grande de Chiloé. The guigna male did not seem to maintain a home range. He travelled over a large territory, probably in search of females, and was likely to be found anywhere in it from day to day. He would travel to a place, stay a short period, and then leave only to show up elsewhere for a like period. I believe the male Andean mountain cat I observed did the same. He had adequate water, ample food, but no females, and so, I believe, roamed a great area that included, but was not restricted to, my study area. Because he showed no fear of humans; hunted actively and intensely in my presence; and because no vegetation was higher than my thigh and I could survey large areas from prime vantage points; and because I spent on average six hours per day walking the rock piles making observations, I believe this male was either a transient or roaming a vast area.

Within a cave near Putre (3,300m) east of Arica, Chile, there is a pictograph of a figure with arms and hands outstretched. At the figure’s fingertips are three species of cats: one is large (puma), one is medium-sized with a thin tail (pampas cat) and one is small with a large thick tail (Andean mountain cat). One Aymara woman I met had five stuffed cats: two puma juveniles, two adult pampas cats, and one adult Andean mountain cat. She reported to me that cats were part of Aymara’s spiritual lives. They had been for as long as there have been Aymara people. With the exception of the pumas, her stuffed cats were more than 20-years-old. Now, she lamented, the other cats were most likely gone.

In the Andean mountain cat lie the conservationist’s greatest hopes and fears. The Aymara fear that the young people prefer CD players to important cultural ceremonies. Some conservationists wish the cats were numerous, so numerous, that they could be harvested for ceremonies by the Aymara, thus helping keep their culture alive. And yet how can a cat that is fearless of people and used in important festivals be protected for future generations. Is this the last generation of an ancient people and their icon?

I am planning a second visit to another study area, where I hope cats are in greater densities to allow a radio-tracking study.

Acknowledgements

I wish to thank the Bosack and Kruger Charitable Foundation and Kristin Nowell’s Cat Action Treasury for their generous support of my project. I also thank the Denver Zoological Foundation, the Rocky Mountain Chapter of the American Association of Zookeepers, and Mountain Views Farms Breeding and Conservation Centre for financial support. Dr Agustín Iriarte, Servicio Agropecu y Ganadero, Chile, provided the necessary permits and suggested the study area. Corporacion Nacional Forestal (CONAF) provided living quarters. Fernando Elorza Marcos and Jose Luis Galaz (CONAF), and many CONAF park guards provided much appreciated logistical help. The local Carabineros also aided my project and donated a stuffed juvenile pampas cat complete with ceremonial ribbons. Ms Barbara Knapton, Putre, helped me acquire an Andean mountain cat skin. Mr John Wagenknecht provided assistance throughout my study and I thank him.

References


* Director of Conservation, Mountain View Farms Breeding and Conservation Centre, Langley, British Columbia, Canada
Home-range and Activity Patterns of Kodkod *Oncifelis guigna* on Isla Grande de Chiloé, Chile

by Augustin Iriarte W.* and Jim Sanderson**

On Isla Grande de Chiloé residents know *Oncifelis guigna*, the kodkod or guigna, as Huina (chief), or *Gato montes* (forest cat). Both terms are appropriate descriptions of the guigna. As a raider of domestic fowl the guigna is considered a bold thief. Because guignas are small and live in the forest the term *Gato montes* is widely used. No local residents recognized the name "kodkod". Here we report on activity patterns and home-range sizes of male and female guignas in the human-dominated landscape of northern Isla Grande de Chiloé.

Two guigna complexes 15km apart were studied. In the El Quilar complex males 063, 182, and 393 maintained abutting home-ranges from north to south, respectively. Male 182's home-range overlapped females 22 and 201 whose home-ranges did not overlap. The southern-most male 393's range contained at least one female that was visually identified but not collared. Sunquist and Sanderson (1998) included home-ranges based on preliminary data. Here we report on all the data collected during which time both 063 and 182 were caught raiding henhouses and killed.

Following the death of 063, male 182's home-range expanded northward to include part of 063's previously occupied territory. About two weeks elapsed before male 182 had occupied 30% of male 063's range. On January 19, 1998 male 182 was killed. Subsequently, male 393's range expanded successively northward and within three weeks included both females 022 and 201 (Table).

Table. Home range sizes (ha) of radiotagged guignas in the El Quilar guigna complex after the death of 182.

<table>
<thead>
<tr>
<th>Individual (m/f)</th>
<th>Hectares (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>393 (m)</td>
<td>310.3 (107)</td>
</tr>
<tr>
<td></td>
<td>human homes in range</td>
</tr>
<tr>
<td>022 (f)</td>
<td>155.0 (100)</td>
</tr>
<tr>
<td>201 (f)</td>
<td>23.76 (130)</td>
</tr>
</tbody>
</table>

Activity data of male and female guignas was also collected. Guignas were found to be active 54.3% of each 24 hour cycle. During daylight hours guignas were active 48.4% of the time, and at night guignas were active 75.4% of the time. This difference was significant (X²[2] = 5.1). Males were found to be active 46.8% of the time while females were active 64.1% of the time, a significant difference (X²[2] = 3.9).

Several possible explanations exist to explain this data. Male guignas (2.2 kg) were capable of taking larger prey items such as domestic fowl, Chilean pigeons *Columba arauacana*, and southern lapwing *Vanellus chilensis*. Female guignas (1.7 kg) were never observed attacking such large prey. Therefore, females may have spent more time stalking prey, typically small forest birds, lizards, and rodents. Two peaks in activity are apparent. The predawn peak perhaps corresponds to guigna's attempts to prey on forest birds, such as chucato tapaculo *Scolorchilus rubecula* and huët-huets *Pteroptochos tarnii*. Chucato and huët-huet alarm calls were heard when guignas were nearby. Such stalks could last several hours especially during chucato nesting season. The early night activity peak may have corresponded to increased rodent activity. Another explanation is that males guignas appeared to make long distance movements during predawn and early night periods. Further analysis of movement data is necessary to test this hypothesis.

**Effect of fragmentation**

Woodroffe and Ginsberg (1998) recently reported that wide-ranging carnivores were more likely to disappear from protected areas regardless of their population size because such species came into contact with people along reserve edges more frequently. Data on 10 carnivores were used to support this conclusion. Our data support and extend this conclusion. Our data suggests that male carnivores are more likely to suffer human-caused conflicts than females. This is because males have home-ranges that overlap several female home ranges. Male ranges most often included human homes, and males travelled between females and therefore invariably came into contact with humans, their pets, and domestic fowl. Males more frequently crossed roads, thus risking exposure to domestic dogs. Inevitably, males were more tempted to take domestic fowl, especially free-ranging fowl, than females.

Though traveling guignas made use of corridors of vegetation, culverts, and other protective cover, our data, though limited, suggest that male carnivores whose home-ranges are typically larger than females were more likely to come into conflict with humans. These conflicts were rarely resolved in favor of guignas.

**Acknowledgements**

JGS wishes to thank the field crew John Arnett, Andy Jennings, Libby MacDonald, Steve McGhee, Laura Phillips and spouse Dr Joan Morrison for help with data collection. Dr Juan Armesto and Dr Mary Willson made Senda Darwin Ecological Research Station available. This study was undertaken entirely on private land. We thank the many private landowners that provided our team with full access to their property.

The Bosack and Kruger Charitable Foundation through Kristin Nowell's Cat Action Treasury (CAT) provided generous support for the study of guignas on Isla Grande de Chiloé, Chile. Servicio Agrícola y Ganadero (SAG), Chile, granted the necessary permits and provided logistical support for our project.

**References**


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** Director of Conservation, Mountain View Farms Breeding and Conservation Centre, Langley, British Columbia, Canada
Translocation of Oncilla and Jaguarundi in Central Brazil

by Flávio H. G. Rodrigues* and Jader Marinho-Filho**

Five small cat species occur in Brazil: oncilla Leopardus tigrinus, margay L. wiedii, jaguarundi, Herpailurus yagouaroundi, Geoffroy’s cat Oncifelis geoffroyi, and pampas cat O. colocolo. These small cats may be found in sympatry in different combinations. At least two species, the oncilla and jaguarundi, were recorded in the area of influence of the hydroelectric reservoir of Serra da Mesa, northern region of the state of Goiás, Central Brazil. This reservoir, in the upper reaches of the Tocantins River, one of the main tributaries of the Amazon, is one of the biggest ever made in Brazil. The dam was closed in October 1996 and the reservoir will be completely full by mid-1999. By that time, 288 islands from 1 to 4,500 ha will have been formed and a total area of 1,780 km² will be flooded.

The oncilla is one of the least known small spotted cats (Eisenberg, 1989). There is almost no information about habitat requirements, home ranges, population patterns and densities, and coexistence with other small felids (Oliveira 1994; Nowell & Jackson, 1996). Mondolfi (1986) says that it prefers forest formations, but this species has been found in open habitats, such as the cerrados, a kind of savanna, in the north-northeast (Oliveira 1994) and central Brazil (JMF & FHGR, pers. obs.) and in the caatingas of northeastern Brazil (Ximenez, 1982; Olmos, 1993). Jaguarundis occur in a great variety of open and forested habitats all over Brazil. Although it has been studied in Central America (Konecny, 1989), almost nothing is known about this species in Brazil.

As part of the studies on the environmental impacts caused by this enterprise, researchers from the Department of Zoology of the University of Brasilia have been monitoring wild populations of vertebrates, including small mammals, some carnivores and xenarthrans (anteaters, sloths and armadillos), birds, lizards and amphibians since before the dam was closed. We received five cats, one jaguarundi and four oncillas, from the rescue operation. All were healthy adults in good physical condition, captured in places that were being inundated between May and August 1997. They were measured, weighed, sexed, tattooed and, after receiving a radio-collar, they were released at different points near the margins of the reservoir. The vegetation in these release sites is typical of the cerrado, since most gallery forests, the main type of dense forest formation in the area, had already been inundated.

From previous experiences (Nowell & Jackson, 1966) it is known that some translocated felid individuals tend to stay around the release site whilst other may travel great distances. All the animals we monitored but one L. tigrinus female moved far away from the release site. This female stayed near the release site for five months until she lost the radio-collar and we could not track her any more. Although released on peninsulas that were going to become islands, two other oncillas and the only jaguarundi went to the reservoir border after release. One male oncilla also stayed for one month on the peninsula where it was released. Then he moved to the margin and later to the gallery forest of the Tocantins, downstream. After that we lost contact with his radio transmitter.

We observed that home ranges of males and females oncillas may show striking differences in size. An adult male we followed had a home range of 17.4 km², while an adult female used an area of only 0.9 km².

Most felid translocations and reintroductions have involved larger species. This management practice may prove to be very important for the conservation of a number of species in a wide array of circumstance, particularly in the case of small reserves. However, some important blanks still remain to be filled in order to better evaluate the success of these practices. Some of the most important are related to the behavior of translocated animals, but the behavior of previously resident, conspecific individuals at the release sites and the relationship with other felid and carnivore species also deserves the attention of researchers and conservationists.

Acknowledgements
This study was financed by Furnas Centrais Eletricas S. A. and Serra da Mesa Energia S. A. The monitored animals were generously provided by the Fauna Rescue Operation of Serra da Mesa, coordinated by Prof. Nelson Jorge da Silva Jr. We also thank Adriano Hass, Hamilton Garbogini Santos, Euripides Brito and all those who helped with fieldwork.

References

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Speedy Cheetahs

A captive-bred cheetah clocked 52 mph (83.7 kph) by radar at a fund-raising event called "Run for Survival" in favour of the Cheetah Conservation Fund on 23-24 May 1999.

Dawn Simas, Director of Wild About Cats and owner of the cheetah, Shaka, said the event, held in "Silicon Valley" between Los Gatos and Los Altos, California, may have raised US$75,000, which will go towards building a laboratory and staff housing at the CCF project in Namibia <http://www.cheetah.org>. She said videos of the cat running had been posted on the web site <http://www.wildaboutcats.org/cheetah.htm>. She warned that the big flies take about 10-15 minutes to download at 28.8 baud, but adds that they are worth it.

In Kenya in 1965, a 35kg female cheetah achieved a mean time of 64 mph (102.4 kph) in three runs over a 220 yard (201.2m) course. She had 30 minutes rest between each run.

N.C.C. Sharp, then an athletics coach used to hand timing, describes the test in the Journal of Zoology (Sharp 1997). The cheetah had been orphaned as a cub and raised on a farm. The course was firm, level ground with a slight covering of murram dust. There was no wind. An analogue stopwatch was calibrated with others from the Kenya Amateur Athletics Association and Voice of Kenya radio.

The cheetah had a running start of 18m and when it broke a taut piece of white wool, the stopwatch was started by the timer standing in an open Landrover 75m down the course with a piece of meat in his hand. When the cheetah broke the second wool tape with its anterior thorax, the watch was stopped and the meat thrown down.

The recorded times were 7, 6.9 and 7.2 seconds, giving a mean time of 7 seconds — a speed of 64 mph (102.4 kph).

Sharp compared the speed with those of other mammals, including horses and dogs, and declared that the cheetah had "by far the highest reliably-reported running speed for any animal".

He said that a widely-quoted speed of 71 mph (114.3 kph) had been discredited as it involved a tame animal said to have run 80 yards (73m) in 2.25 seconds, but the track was later shown to be only 65 yards (59m) long. He declared that M Hildebrand's estimate (1961) of 56 mph (90.1 kph) was not from a timed run, but was calculated by analysing film, taking the scale of distance from an estimated length of the cheetah's body.

References


Attitudes of Hong Kong Chinese Towards Wildlife Conservation*

Executive Summary

The need for this survey has been underscored by repeated instances of illegal trade in rhino horn, tiger bone and their medicinal derivatives in Hong Kong. Therefore, TRAFFIC East Asia set out to scientifically document the demographics of those among the Hong Kong population who might be potential consumers of these products. It was hoped that documenting these demographics would aid public awareness and law enforcement efforts towards stopping illegal trade of this kind. This research was conducted in July 1996, using random sampling methods and a telephone survey of a sample representative of the Hong Kong Chinese population as a whole. There were 1,157 successful interviews during the survey, representing a response rate of 54.3%. The standard margin of error is less than 1.5%.

This survey found that about 6.8% of Hong Kong's adult population uses Traditional Chinese Medicine (TCM) regularly and that users are more likely to be women than men. While about 35% of TCM users seek advice from TCM practitioners and TCM shop assistants, over 50% of TCM users would not try to ascertain the ingredients of TCM prescribed to them. Among TCM users in Hong Kong, three-fifths (59%) claimed they would refrain from using TCM purporting to contain parts of wild animals. Perceived need and efficacy collectively were cited as one of the major reasons why TCM users would use TCM containing parts of wild animals. People with lower educational levels were found to be more willing to pay higher prices for TCM containing parts of animals taken from the wild, as opposed to animals bred in captivity.

Fourteen percent of TCM users would continue to consume TCM containing endangered animals that are protected by law, while another 37% might do so "depending on the situation". Among this 37%, two-fifths (41%) would do so if it were perceived to be necessary. Seven percent of the TCM users (or 2% of the total sample) had used TCM claiming to contain rhino horn, while another 4% of TCM users (or 1% of the total sample) had used TCM claiming to contain tiger bone.

This survey confirms that there is a residual demand among the adult population of Hong Kong for TCM containing rhino horn and/or tiger bone, and that males and older TCM users are more likely to use such products. Sixty-five percent of "rhino horn users" and 69% of "tiger bone users" said they would stop using medicines containing these ingredients if informed that such use were prohibited by law. Twenty-three percent of rhino horn users and 19% of tiger bone users, however, stated they would continue using these products, even if they knew it were against the law.

About three-fifths (59%) of the adult population expressed concern about endangered species. More than three-quarters (77%) of these respondents agreed to give up certain TCM if that would help save wildlife from extinction. Nearly 70% of the adult population expressed the belief that humans would be adversely affected if wild animals were to become extinct. The majority of people found to be supportive of wildlife conservation were younger and better educated. Users of TCM were generally more supportive of wildlife conservation than were non-users. Among TCM users, those who do not use TCM containing wild animal parts expressed more concern for wildlife conservation than did those who use TCM containing wild animal parts. Those people who used TCM containing wild animal parts in general did not feel that their use of wildlife as medicine has an impact on the ecology. Three-quarters (74%) of TCM users support the use of laws to prohibit the use of endangered animals as TCM ingredients. Only 14% of the TCM users would definitely continue to use TCM containing ingredients derived...
from animals protected by law despite being informed of legal prohibitions. Sixty-five percent of "rhino horn users" and 67% of "Tiger bone users" would stop such use if they were informed of such prohibitions.

One-third (33%) of the adult population had consumed exotic animals. Males and older people were more likely to have eaten exotic animals. Snake was the most popular exotic animal for consumption, China, the most popular place for eating exotic animals, followed closely by Hong Kong. More than half of the adult population had consumed tonics containing wild animal derivatives. Females and the younger generation were found to be the main users of these health tonics.

In summary, this survey found that a majority of Hong Kong Chinese, and especially those who use TCM, expressed concern about wildlife and wildlife conservation and would voice support if they were well-informed of the relevant issues.

**Recommendations**

- Effective channels of communication have to be explored to convey the issue of the relationship of TCM and wildlife protection to the members of the TCM community (particularly TCM practitioners, shop assistants — and students studying TCM) and TCM users.
- Local legislation and regulatory measures implementing CITES should be incorporated in TCM courses in Hong Kong.
- Disciplinary mechanisms to self-regulate the use and trade in endangered species within the TCM community should be encouraged by the proposed statutory TCM body in Hong Kong. Among the end-use consumers, male and older TCM users, who are more likely to consume rhino horn or tiger bone, should be the target group.
- The "undecided users of endangered animal parts" should be polled in order to document their deciding factors.
- New immigrants from the rest of China (>1.7 million in the next 20 years) should be targeted in public education programmes.
- Alternatives and substitutes which have proven effective should be explored and promoted among "TCM users" and TCM practitioners.
- Consideration also should be given to further exploring options for captive-breeding and propagation of medicinal species, in order to relieve commercial pressure on the wild populations.

**Reference**

Maehr criticises the assessment of the panther’s status and proposals by the IUCN Conservation Breeding Specialist Group, which, in 1989, using data mainly from 1981-85, when the cat was characterized as “an old, anaemic, disease-ridden and non-productive population”, predicted early extinction. Capture of the remaining cats in the wild and captive breeding were assumed to be the only way of preventing extinction. Maehr says his team saw that, in fact, panthers were healthy, long-lived and reproducing, and they opposed “untested and possibly inappropriate manipulations”. Maehr was officially told that he was “insufficiently knowledgeable to have an opinion on the subject”.

Stressing the need for panthers to use private lands if they are to survive, Maehr recounts the problem of dealing with proprietors. Livestock are seldom bothered by panthers, which feed on adequate resources of wild hogs, a species introduced from Europe, and many landowners are proud to have panthers on their land. For them the problem is the threat of restriction of their rights by governmental authorities. In fact, these private lands retain the best habitats for panthers, while some of the protected areas are only so because they are unproductive land, which farmers don’t want.

In a review of Maehr’s book, John Seidensticker, a leading authority on large cats and their conservation, wrote: “The future of the Florida panther rests with the people of Florida, the value they place on the panther, and their political will to implement and sustain a policy to preserve the species. Pending off the impending extinction of the panther is beyond the reach of any single individual or even a well-intentioned group. Solutions to the problems posed by large, endangered carnivores must be taken up by societies as a whole.”

That is a lesson that must be learned by all seeking to conserve large carnivores. Good preparation for an experimental, timebound release of Texas cougars in northern Florida won wide urban support, but loss of a few livestock led farmers to form a “Not in our Backyard Association”. In vast areas of Asia, Africa and South America, it is not easy to achieve the necessary measure of support when communities and individuals feel their livestock (their wealth), in some cases even their lives, threatened by the carnivores. Only by understanding their situation and working with them to reduce predation to a minimum can people living with large carnivores be won over. Of course, the Florida panther is not a threat to human life, and very little to livestock, and the need in Florida is to win the cooperation of private landowners so that the panther has space to survive.

By coincidence, private lands are the subject of an editorial in Conservation Biology (Vol. 13, April 1999; pp.223-224). Richard L. Knight of Colorado State University, points out that nearly half of all species threatened with extinction in the USA occur on private lands, and nearly all threatened species have at least part of their distribution on private lands. He declares that finding ways to use private lands while conserving their natural heritage should be of primary concern to conservation biologists, adding that the magnitude of the issue extends beyond US borders.

Peter Jackson

The Secret Life of Tigers
by Valmik Thapar
Oxford University Press, Delhi
99 pp.

This is a reprint of the text, in pocket book size, of Thapar’s full-size book Tigers: The Secret Life (Elm Tree Books 1989). It describes remarkable observations of tiger social life in the tiger reserve of Ramthambhore during the mid-1980s. Day after day, Thapar and Fateh Singh Rathore, the Field Director, tracked the tigers and spent hours watching their behaviour and getting remarkable photographs. Their observations of male tigers fraternising with their cubs and their mother overturned the long-held belief that males always killed cubs. Offered at a price of Indian Rs295 (about US$8.00) it is designed to promote wider knowledge of tigers among Indians who can generally not afford western-published books.

The Year of the Tiger
by Michael Nichols and Geoffrey Ward
National Geographic Society, Washington DC
ISBN 156
156 pp.

A magnificent book of photos of tigers in India by Michael Nichols, with a text by Geoffrey Ward, an American historian who lived in India as a child and returns frequently to see tigers in the wild. Nichols’ photos, many taken by camera traps, are spectacular and reproduced in a dramatic form. However, some are rather too dark, especially one of gaur (wild cattle) in which the silhouetted animals are barely visible in the dark background.

Mammals of Sabah:
Field guide and identification
by Shigeki Yasuma and Mahedi Andau
Japan International Cooperation Agency & Sabah Wildlife Dept, Malaysia
ISBN 983-50057-0-9
181 pp.

Shigeki Yasuma has spent many years studying the mammals of Borneo, first in east Kalimantan, then in Brunei and now, Sabah. For each area he has produced an educational book full of technical advice and drawings to aid researchers, students and interested public. While concentrating on Sabah, the book provides an overview of the island of Borneo, covering geology, climate, vegetation, and wildlife reserves.
Wild About Cats: Life with Arabia’s Endangered Felines
by Marijke Jongbloed
Barkers Trident Communications
London UK
ISBN 0-9634689 0 9 (84 pp.)

Marijke Jongbloed is a medical doctor who gave up her practice to devote herself to wildlife conservation in the United Arab Emirates, and especially the wild cats. She founded the Arabian Leopard Trust to raise public awareness, breed endangered species in captivity and promote creation of wildlife reserves. She is also manager of Sharjah Desert Park. This is a very personal story written with great feeling.

Wild Cats of the United Arab Emirates
by Mohammad Ali Reza Khan
Dubai Municipality
50 pp.

Reza Khan is a Bangladesh wildlife biologist who has spent 17 years in the United Arab Emirates, first in the zoo of Al Ain and then as Head of Dubai Zoo. After a general review of wild cats, he provides detailed descriptions of Arabia’s species – leopard, caracal, sand cat and Gordon’s wildcat, a subspecies of the European wildcat Felis silvestris. There is a useful bibliography and a select list of mammals and birds with their Arabic names.

Wanted Alive: Tigers in the Wild 1999-06-05
by Peter Jackson and Elizabeth Kemf
WWF, Gland, Switzerland
ISBN 2-88085-230-7
32 pp.

This the third, updated edition, of a wide-ranging review of the status of the tiger and WWF’s conservation efforts.

Kanha Tiger Reserve: Portrait of an Indian National Park
by Carroll Moulton and Ernie J. Hulsey
Vakils, Feffer and Simons Ltd, Mumbai, India
ISBN 81-87111-17-8 (220 pp.)

Carroll Moulton, an American academic and Ernie Hulsey, an interior and architectural designer, have had long interest in Kanha National Park in central India, which is one of the world’s great nature reserves. They have spent months every year roaming the 50-year-old park and now provide a full-scale guide to its wonders. Practical advice on travel and how to behave on game drives, is followed by explanations of the Kanha ecosystem, vegetation, major mammals, birds and reptiles, and the people, such as the managers, forest guards and elephant men, who maintain the park. The authors review the impact of ecotourism, and make recommendations for future management to enhance the attractions of Kanha. There is a useful glossary of terms for the new visitor to India, and a bibliography covering publications relevant to Indian wildlife.

Linkages in the Landscape: The role of corridors and connectivity in wildlife conservation
by Andrew F. Bennett
IUCN—The World Conservation Union
ISBN 2-8317-0221-6 (254 pp.)

Fragmentation of forests and other wildlife habitat is one of the main causes of reduction in wildlife numbers in the 20th century. Most reserves are islands surrounded by a human sea, too small to accommodate viable populations of large mammals. A large carnivore, like the tiger, is always relatively rare compared with its prey, and in many reserves there are fewer than 50 survivors, still threatened by poaching, directly of themselves, and indirectly of their prey. Elephants traditionally roamed over vast areas through the seasons, but agriculture now cuts their old routes, and often provides attractive foods which bring them into bitter conflict with farmers. Inbreeding is bound to occur in small populations bringing with it the danger of genetic deterioration leading to decline and possible extinction. A solution to these grave problems is the maintenance and creation of corridors linking subpopulations and permitting movement over large areas. Andrew Bennett provides an overview of the issues and set out practical ways of designing and managing corridors, with working examples.

Wildlife Crime: An Enforcement Guide
by Vivek Menon and Ashok Kumar
Natraj Publishers, Dehra Dun, India
ISBN 81-85019-75-4
140 pp.

Drugs, art and wildlife are multi-billion illegal businesses afflicting the modern world. What comes to light is just the tip of the iceberg. Each damages our world in its different way. In the case of wildlife, it is destroying our natural heritage, and driving towards extinction a vast range of species already suffering the pressures of the exploding human population and its demands on the natural environment. India’s rich wildlife has been a major sufferer. Vivek Menon and Ashok Kumar have been leaders in the battle to combat the illegal trade, and lean on their wide experience to provide practical advice on enforcement of existing laws, and investigative techniques including surveillance, searching the scenes of crimes, collection of evidence, and identification of animal parts and plants, together with taking cases effectively to court.

Spring 1999
Reintroduction Practitioners
Directory 1998
by Pritpal S. Soorae and Philip J. Seddon
National Commission for Wildlife Conservation and Development, POB 61681, Riyadh, Saudi Arabia
ISBN 9960-614-08-5 (95 pp.)

Anyone contemplating reintroduction of wild species will welcome this compilation of book of addresses of persons and organisations involved in projects in various parts of the world, conveniently organised under taxonomic groups, except for plants, for which countries form the framework.

The Amur Tiger in Russia: An annotated bibliography
by E.N. Matyushkin
WWF, Russia, Moscow, Russia
In Russian and English
412 pp.

The Amur tiger is the preferred name of what most of the public know as the Siberian tiger. In fact, its habitat in the Far East of Russia, China and Korea more resembles central and northern Europe than the dark, snow and ice-bound coniferous forests of most people's imagination. Heavy hunting and loss of habitat and prey brought the tiger in Russia to near extinction, with fewer than 50 thought to survive in the 1940s - but there were still hundreds in China. The Soviet authorities took strong measures to conserve the surviving tigers and rebuild the population, which were very successful. Highly-trained wildlife biologists studied the tiger, but most of their findings are virtually hidden from the rest of the world by being in Russian. Foreign biologists were unwelcome until the US-based Hornocker Wildlife Trust forged a link with Russian Academy of Sciences for joint studies in the Sikhote-Alin reserve north of Vladivostok. Evgeny Matyushkin of Moscow State University has been a leading researcher and has compiled the first bibliography on the Amur tiger in Russia, which opens a wide window on the literature, largely in Russian. The annotations in English provide the non-Russian speaker with a valuable insight to existing riches as well as direct information. There are maps and diagrams, as well as black and white photos of tigers, prey and habitat.

Publication of the bibliography has been made possible by funding from USAID and WWF, organisations which have been playing major roles in promoting conservation of the Amur tiger and its homeland.

The Tiger Hunters
by Anatoly Bulov
Raduga Publishers
Moscow, Russia
ISBN 5-05-001665-7
293 pp.

Catching tigers with bare hands, aided by nets and forked poles, has been a Russian speciality. It was no job for weaklings, or even for ordinary folk. This book is fiction, based on the adventures of known tiger hunters who endured immense privations in the bitter, snowy winters of the Russian Far East to catch tigers, usually cubs (but pretty large ones too) for zoos. Weeks spent searching for information of tiger sign from villagers and forest workers, and then following tiger tracks for days and days, finding remains of prey, tricking a tigress to separate her from her cubs, and then the final charge and wrestling match to get the captive safely in the bag, preferably with injury to the animal or themselves. And, of course, oft times without success. Hunters' huts, by custom stocked with supplies for the passing traveller, often provided shelter, but there were nights when survival rested on skilfully building a soda consisting of two slow-burning fires to sleep between. That meant selecting the right trees and cutting them before constructing the fire. These men were the elite of the trappers, and their skills are probably in being lost. The 'Tiger Hunters is a fitting tribute to their hardness and skills.

The English translation was published in 1988 and it is not an easy book to get. It was once available from stores dealing in Soviet publications, and maybe you have a Russian friend who might be able to help.

Obituary

Dr Kalyan Chakrabarty

Dr KALYAN CHAKRABARTY, a long time member of the Cat Specialist Group who was a leading expert on the Sundarbans mangrove delta of India and Bangladesh and its tigers, died of a heart attack on 28 November 1998 at the age of 55.

He graduated from Calcutta University in statistics and received his Ph.D. from Sambalpur University, Orissa, for his thesis "Man, Plant and Animal Interaction – Statistical approach to bio-ecological study of West Bengal forests".

Chakrabarti was a prolific writer of scientific and popular science works in English and Bengali, with more than 350 publications to his name. He was declared International Man of the Year in 1985 and 1998 by the American Biographical Institute for his pioneering research on the tiger.

At the time of the death he was Chief Conservator of Forests (Research) of West Bengal. He is survived by his wife.
Riding the Tiger

Tiger conservation in human-dominated landscapes

Edited by John Seidensticker, Sarah Christie and Peter Jackson

Published by Cambridge University Press

Available from
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World Wide Web

Cat Specialist Group: http://lynx.uio.no/catfolk
provides species accounts from the book Wild Cats: Status Survey and Conservation Action Plan, compiled and edited by Kristin Nowell and Peter Jackson (IUCN 1996), newsletter Cat News, and other information about the group. The site is still being developed to provide much more information

IUCN-The World Conservation Union: http://www.iucn.org
covers all activities of the Union

Species Survival Commission: http://www.iucn.org/themes/ssc
covers SSC activities and has a complete list of specialist groups, their chairs and contact persons

Cat Action Treasury: http://www.felidae.org
raises funds for projects approved by the Cat Specialist Group

CITES: http://www.cites.org
The Convention on International Trade in Endangered Species of Wild Fauna and Flora

World Conservation Monitoring Centre: http://wcmc.org.uk/
provides access to databases on species and protected areas

Tiger Information Centre: http://www.5tigers.org
put up by the Minnesota Zoo is a mine of data about tigers. The site also carries the contents lists of all issues of Cat News, as well as reproducing all the newsletter's items on tigers

Help Save the Tiger: http://chitwan.gis.umn.edu/tiger/tigindex.html
is put by the University of Minnesota and, in particular, provides GIS maps of tiger distribution in south-east Asia, as well as information on on-going activities

Hornocker Wildlife Institute: http://www.uidaho.edu/rsrch/hwi
reports on research on the Amur tiger, as well and mountain lions

International Snow Leopard Trust: http://www.snowleopard.org/islt
covers the widespread activities of the Trust. Of particular interest is the related page on satellite tracking of snow leopards in Mongolia: http://detox.mesc.nbs.gov:80/snow-leopard/mslm.html

World Lynx: http://lynx.uio.no/jon/lynx/lynxhome.htm
has information on all four lynx species, including the species accounts from Wild Cats

Asiatic Lion Information Centre: http://wkweb4.cableinet.co.uk/alic/

Kingdom of Lions: http://home.worldonline.nl/~rlion/ tlindex.htm

Cheetah Conservation Fund: http://www.cheetah.org
Namibia-based, the CCF covers cheetahs worldwide

AfriCat: http://www.africat.org
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Projeto Puma: http://portadig.com.br/projetopuma
reports on puma predation on livestock in southeastern Brazil

reports on studies of the kodkod in southern Chile

African-Arabian Wildlife Research Centre: http://info.simplenet.com/AAWRC
is the home page of Chris and Tilde Stuart, leading field workers in Africa and Arabia

Florida Panther Society: http://supermet.net/~chrisd/panther.html
reports on one of the world's most endangered cats

Mountain Lion Foundation: http://mtn-lion.org/

Tigris: http://web.inter.nl.net/users/tiger/
is dedicated to saving the Amur tiger and Amur leopard

Cats: Wild to Mild: http://www.lam.mus.ca.us/nhm
put up by the Los Angeles County Museum

Mammal Species of the World: http://www.nmnh.si.edu/msw
provides access to the widely-accepted taxonomy published in Mammal Species of the World (Smithsonian 1993)

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Cat Action Treasury is a nonprofit organization for the conservation of the world's 36 species of wild cat. CAT works closely with the pre-eminent source of scientific expertise on the family Felidae: the World Conservation Union's Cat Specialist Group. The Cat Specialist Group has produced a Cat Action Plan - a comprehensive guide to wild cats and their conservation. CAT's mission is to organize and fund those projects ranked high priority by the Cat Action Plan.

CAT was established in the U.S. in 1996, following publication of the Cat Action Plan. We are based in Los Gatos, California, in the heart of Silicon Valley, and directed by Kristin Nowell, Vice Chair for Projects of the Cat Specialist Group. Through our international network of consultant specialists, CAT is leading conservation efforts for the rarest and most endangered cats around the world.

Our projects and programs depend on public support. CAT focuses on high priority cat species, including several which have never been studied and are on the brink of extinction. After reading more about our work by clicking on the program icons below, please help us continue to help wild cats by making a fully tax-deductible donation.

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