Caprinae

Newsletter of the IUCN/SSC Caprinae Specialist Group

May 2001

In this issue

Editorial

The status of flare-horned markhor in northwestern Pakistan is repoted to be improving due to local conservation efforts. Other good news is that Nubiasn ibex in Israel appear to be habituating to human presence. Notices for 2 conferences of interest are included in this newsletter, along with contact information.

A call to CSG members for recent publications necessitated a separate page of the Newsletter. Please remember to submit such information to me on an ongoing basis so that we can keep all our members up to date. This is especially useful for those lacking ready access to library facilities with international journals.

There are 2 upcoming conferences that should be of interest to CSG members. The 25th International Union of Game Biologists to be held next September in Cyprus, and the 3rd World Conference on Mountain Ungulates, that will be held in June 2002, in Spain.

David Shackleton
Editor

Status of Flare-horned Markhor in Chitral Gol National Park and Tushi Game Reserve, Pakistan

Introduction

The flare-horned Markhor (*Capra falconeri falconeri = C. f. kashmirensis*) is considered "endangered" in Pakistan (Hess et al. 1997) and the species is classed as Endangered (Enc2a) in the 2000 IUCN Red List. In the Northwest Frontier Province (NWFP) the subspecies occurs in several areas. One of these, Chitral Gol, was declared as a National Park by the NWFP Government of Pakistan in 1984. The park is composed of an alpine river catchment in the Hindu Kush mountains. It encompasses an area of 7,700 ha, comprised of steep slopes dominated by holly oaks (*Quercus ilex*). Other main trees and shrubs are *Cedrus deodara*, *Pinus gerardiana*, *Abies pindrow*, *Juniperus macropoda*, *Artemesia maritima* and *Rosa webbiana* (Aleem 1978). The valley heads have alpine pastures which are used in summer by markhor. A second area, Tushi Game Reserve lies 16 km north from the town of Chitral. The slopes there have fewer holly oak trees and the vegetation is mainly dominated by shrubs such as *Rosa webbiana*, *Artemesia maritima*, *Astragulus* sp., *Tamarix* sp., and alpine grasses. The area was declared as a game reserve in 1979 and encompasses 1,045 ha.

Markhor populations were surveyed periodically in these two protected areas from 16 March to 5 April 1997. The purpose of the visits was to assess the status of the animals and gather data on population structure. As part of a management program, annual counts of the populations have been undertaken by the game watchers of the two areas since 1988. The data are also evaluated to compare population trends of the animals in the two areas and check differences in the growth rate of the populations.

Markhor Observations

Markhor in Chitral Gol use the lower slopes of the valleys in winter and stay there until the snow melts in the high pastures. Observations were made from the main trail which passes through the valley. When a group was observed the total number of animals in the group and their age-sex classes were identified. A group was considered to be a congregation of animals which were within 50 m of each other and did not split during the time when they were being observed, which lasted from 5-30 minutes. Males were divided into four classes according to age and horn size. Young up to 9 months old were classified as juveniles, and yearlings were about 1 year old. All adult females were lumped into one group.

Sightings in Tushi Game Reserve were made from an observation point along the Chitral-Garm Chashma road. The animals there have the tendency to use the eastern slopes at sunset. They gradually ascend to a high pasture and disappear from view by sunset. In two instances large groups numbering 70 animals were observed but they could not be classified as part of the group was out of view and about 1 km from the observation point. The total counts were based on the number of animals which could be counted as they came into view and moved in a northerly direction behind a ridge.

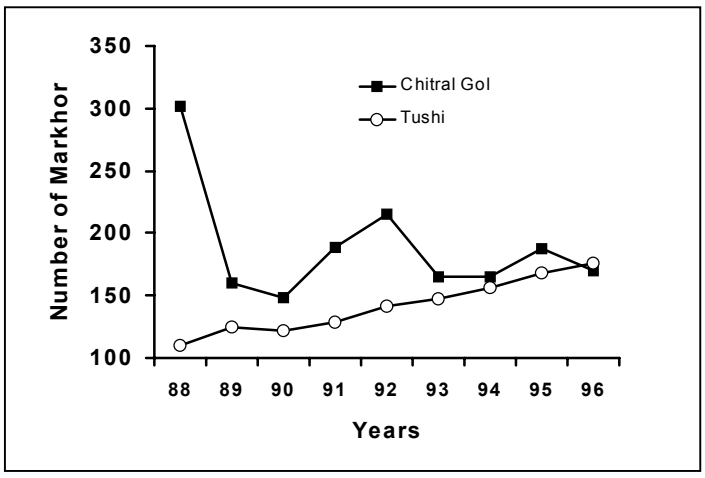
A total of 120 markhor were observed in 14 groups in Chitral Gol during a 2-day survey. Mean group size was 8.6 (range 2-

43) animals. Most of the animals were seen in small groups of up to 8 animals. They were seen feeding on holly oaks on the steep slopes. Among them 11 class IV males were also spotted. Two were seen alone while the rest were with mixed groups. The ratio of males to females in Chitral Gol appears to be about unity with a ratio of 107:100. The female:juvenile ratio was 100:66, while that of female:yearling was 100:12.

The total number of animals observed during four field trips to Tushi Game Reserve was 220. Mean group size was 19.0 (range 2-70). Nearly half the animals were seen in small groups (less than 7) while the others were observed in groups of 14 or more. Of these, 93 could be classified according to their sex-age structure. Adult female: male ratio was 100:34, female:juvenile 100:83, while female:yearling ratio was 100:10.

The number of males observed in Tushi was relatively lower than that observed in Chitral Gol. No class IV males (over 9-years old) were spotted in Tushi, while among the 45 adult males in Chitral Gol 25% were trophy sized males with horns estimated to be over 90 cm in length. These males move slowly and often rested while feeding on the steep slopes.

Annual counts conducted by the game watchers from 1988 to 1966 shows that the number of markhor in Chitral Gol has remained constant with little variation seen in the population since 1989 after a crash which took place a year earlier (Figure 1). On the other hand, a steady increase has taken place in the Tushi population with the number of animals nearly doubling in the past 10 years for which data are available. Markhor density in 1996 was 18.7 animals/km^2. The change in population is confirmed by the game watchers who have been stationed in the reserve for a number of years.



Game watchers reported that the number of males recorded in the population has been low since 1991 and trophy sized males have not been observed. Class IV males were also not seen during the present survey in Tushi.

Discussion

Markhor is gregarious forming large groups when there is a concentration of the population in an area they inhabit (Schaller 1977). Given the relatively large size of Chitral Gol National Park, encompassing several valleys, and an intact vegetation cover which obstructs observation of the animals, it is likely that the annual counts in Chitral Gol have underestimated the population present in the park. During the survey, 11 Class IV males were observed whose trophy size was confirmed by the game watchers accompanying us, when they saw the animals with a spotting scope. Mature males were also reported by Aleem (1977) during a survey of markhor in Chitral Gol.

The number of markhor in the park is probably higher than that estimated by the annual counts. This conclusion is supported by the data collected during the survey in which a total of 120 markhor were counted in 2 days during which only about 25% of the total area of the park was surveyed.

Markhor distribution in Tushi Game Reserve is different from Chitral Gol National Park. The reserve is small in size and the majority of the animals are concentrated in the central part where they find safety from poachers. The annual counts of the game watchers in Tushi are probably closer to the actual number present as observation is not hindered by vegetation cover and the total area the game watchers have to cover is considerably smaller than in the national. Markhor numbers in Tushi have increased since annual counts have been conducted despite the overgrazed condition of the reserves vegetation. Some of the trees have been stripped of their leaves with only the branches remaining intact.

Markhor are specialised browsers and have the capacity to climb trees. They do so by jumping on a low branch, find a secure footing and then start browsing on nearby leaves. In this fashion they can reach the higher branches. A major part of their feeding activity in Chitral Gol and Tushi, in early spring, consisted of browsing on holly oak trees.

The low number of males in Tushi is attributed to poaching outside the reserve (*Why not inside the reserve as well?)*. After the spring thaw the males ascend to high pastures outside the reserve, where they fall prey to illegal hunting. This trend has continued over the years, although it has been reduced to an extent by posting watchers in the high pastures in recent years. Lack of funds for the Wildlife Department funds makes the job difficult

The game watchers in Chitral Gol report the permanent presence of at least 2 snow leopards in the park. An adult female was observed by members of the survey team and a fresh markhor skin was found along the trail close to where the snow leopard was observed. Last year the game watchers found remains of 17 markhor in the park. This indicates that predation by the cat and perhaps wolves, which are also found in the park, probably takes place on a regular basis. The presence of such predators in the Park may have prevented the population from increasing there (Figure 1).

The snow leopard lives a solitary existence, hunts over an extensive area and appears to travel widely (Roberts 1977). This predator has also been observed in Tushi but due to the small size of the reserve it seems to move to other valleys. Thus predation there is sporadic, and unlike Chitral Gol, not many markhor remains have been found in the reserve whose death can be attributed to snow leopard predation.

The markhor population in Chitral is the largest single concentration of the species in the world and has been effectively protected by the NWFP Wildlife Department. Chitral Gol is a relatively intact ecosystem, where a large number of unique fauna and flora is being conserved. Markhor density in Tushi Game Reserve is among the highest reported for a free-ranging ungulate species. To alleviate any problems of range damage, the number of markhor in

the reserve could be reduced by means of translocation of animals to valleys where their numbers are low. However, such a management scheme has not been implemented due to its high cost and lack of funds. Also, translocation will only work if the community development plan works and members participate in protecting their wildlife and not allow poaching. In some valleys people are protecting their wildlife quite diligently, but this needs to be the rule rather than the exception

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Research Reports

Nubian ibex response to human presence in 'Eretz Ha'Machteshim region in the Israeli Negev desert

The behavioural responses of wild animals to human presence are dependent, in part, on the extent and type of interaction. In recent years, the continued expansion of human activity has caused a significant increase in the level of contact between man and wildlife. The world-wide increase in conservation awareness and law enforcement have reduced the levels of direct threats to some wild populations, but brought about an unprecedented increase in eco-tourism. Although eco-tourism is often driven by good intentions, it may have negative effects by altering the animal's behavior and modifying natural selection pressures a population is subjected to (e.g., learning to rely on human handouts).

Our research focuses on the impact of eco-tourism on Nubian ibex (*Capra ibex nubiana*). The Nubian ibex is one of the main tourist attractions in the Eretz Ha'Machteshim region in the Israeli Negev desert. Specifically, we are looking at changes in time budgets (mostly vigilance behavior) and habitat preference of Nubian ibex in response to tourist pressure. We selected 6 populations residing in 6 different areas, which differ in the amount and types of eco-tourism, and are comparing between the behavioural patterns of the ibex between these sites. Three sites offer good accessibility to tourists and are heavily visited by organised tours (buses). These sites include the Mitzpe Ramon visitors centre - located on the outskirts of the town of Mitzpe Ramon along the Makhtesh Ramon cliffs, En-Avdat canyon nature reserve, and Sde-Boqer campus located along the Zin cliffs. Two sites are more remote springs (En Aqev and En Saharonim) which are less pressured by tourists and are usually toured by hikers that can park in the near vicinity. The last site is the Lotz dry riverbed which is visited only occasionally by four-wheel travellers passing through on the dirt road.

Behavior observations are taken every 2 minutes during a 40-minute period by binoculars or telescope. Observers are on foot or in a 4-wheel drive car, and each observation is taken only after a sighted group has been characterised according to its composition (sex and age) and after the ibex appeared to be habituated to the presence of the observer. In addition, we have radio collared animals in 4 of the 6 areas, and we are studying their spatial movement patterns. Eating, walking, resting, and vigilance are the 4 main factors in the ibex's time-budget. Since we expect vigilance to be the strongest indicator of human disturbance we use it as the dependent factor.

In many species, group size is a major factor affecting vigilance. Thus, in each area we regressed vigilance on group size and studied how the slope and intercept of these regressions change with the level of disturbance (number of visitors). Vigilance is an essential behavior in the life of an ibex (more than 10% of the total time budget is invested in this activity). In all sites, the time investment in vigilance was negatively correlated with group size, such that as group size increased the investment in vigilance per individual decreased. We found that the higher the average disturbance in a specific site, the less steep the slope of the regression of vigilance on group size. The flattening of the regression with increased disturbance can be caused either by a surge in vigilance in the large groups or a reduction in vigilance in the smaller groups. Since the Y-intercept from these regressions declined with disturbance, we conclude that the flattening of the regression of vigilance of group size with increased disturbance is caused by a reduction in vigilance in the smaller groups. This implies a habituation process in the disturbed areas. The low CV values of disturbance in those areas reflect this process.

We conclude that in areas with relatively high numbers of visitors (Ein-Avdat, Mitzpe-Ramon and Sde-Boqer) ibex habituate to human presence and no longer view humans as a threat. The fact that ibex get used to human presence in areas with many visitors is not so new. However, this is the first time the exact pattern of this behavioural change is elucidated. Specifically, the time devoted to vigilance is minimal and almost unaffected by group size. As a result, a key behavioural adaptation of wild animals, namely devoting time to vigilance as a function of group size, may be selected against over time and may impact the species future viability.

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Abstracts

J. Feng, 2000. Molecular Approaches for Conservation of Endangered Giant Argali Sheep (*Ovis ammon*) and Dwarf Blue Sheep (*Pseudois nayaur schaeferi*) in Asia. Ph.D. Dissertation, State University of New York at Buffalo. 112 pp.

Conservation of an endangered species requires knowledge of its evolutionary history, as well as the amount and distribution of genetic diversity existing in extant populations. Here, I used molecular genetic approaches to address conservation genetic issues for endangered argali sheep (*Ovis ammon*) and dwarf blue sheep (*Pseudois nayaur schaeferi*) in Asia. First, I examined the phylogeography of 24 geographic populations of argali sheep throughout most of its distribution range using mtDNA control region sequences. Five major evolutionarily distinct lineages were revealed. Traditional morphology-based argali subspecific taxonomy received little support from these molecular analyses. I identified nine conservation units and propose that each unit be recognized as a genetically distinct subspecies. Results also suggest that argali originated in the Pamir region, and then spread to other regions through two paths of radiation. Second, I used both mtDNA control region sequence and nuclear microsatellites to study the population genetic structure of three argali populations in Mongolia. The mtDNA results revealed two evolutionarily distinct lineages, i.e., Altay population and Hangay/east Gobi populations. Microsatellite results indicated that the three populations are genetically distinct from each other, with approximately equal genetic differentiation and gene flow among them. I recommended two conservation units (Altay, and Hangay/east Gobi), and three management units (Altay, Hangay, and east Gobi) for conservation management. The effective population sizes estimated from genetic data were similar to the results of field censuses, and suggest that these argali populations in Mongolia are relatively healthy. Third, I examined the genetic distinctiveness of highly endangered dwarf blue sheep by studying its phylogenetic relationship with blue sheep (*Pseudois nayaur*) using mtDNA control region and Y-linked ZFY intron sequences. The mtDNA results revealed that dwarf blue sheep is a strongly supported monophyletic group with an average of 12.21% sequence divergence from blue sheep. ZFY intron results revealed an average of 0.51% sequence divergence between the dwarf blue sheep and blue sheep, and one haplotype was shared. These results suggest that dwarf blue sheep are genetically distinct from blue sheep, and should receive conservation protection as a unique subspecies.

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Maudet,. C., Luikart, G., & P. Taberlet. 2001. Development of microsatellite DNA multiplexes for wild goats using primers designed from domestic Bovidae. *Genetics, Selection & Evolution.* in press.

Many wild goat taxa (Capra spp.) are endangered and would benefit from the availability of molecular tools that are useful for population management and conservation. We developed microsatellite DNA markers useful in all wild goat species, by using a cross-species amplification approach. Seventy-five microsatellites primer pairs designed from domestic cattle (*Bos taurus*), sheep (*Ovis aries*) and goat (*Capra hircus*) were tested on three distantly related Capra species: *C. ibex ibex*, *C.* [*i.*] *sibirica*, and *C. pyrenaica*. On average, 90% of the domestic ungulate primers amplified a microsatellite PCR product in all the wild goat species. Forty percent of the total were polymorphic in *C. i. ibex*, which is expected to have the lowest genetic diversity among all Capra species. We developed multiplexes of 24 polymorphic fluorescent microsatellite loci that can be amplified in 13 PCR reactions and loaded into two gel-lanes. These microsatellites will allow studies of conservation, ecology and forensics in all Capra species, and the multiplexes will reduce the time and cost of the genetic analyses.

Luikart, G., Gielly, L., Excoffier, L., Vigne, J-D., Bouvet. J. & P. Taberlet. 2001. Multiple maternal origins and weak phylogeographic structure in domestic goats. Proceedings of the National Academy of Sciences, USA. in press

Domestic animals have played a key role in human history. Despite their importance, the origins of most domestic species remain poorly understood. We assessed the phylogenetic history and population structure of domestic goats by sequencing a hypervariable segment (481 bp) of the mitochondrial (mt) DNA control region from 406 goats representing 88 breeds distributed across the Old World. Phylogeographic analysis revealed three highly divergent goat lineages (estimated divergence >200,000 years ago), with one lineage occurring only in eastern and southern Asia. A remarkably similar pattern exists in cattle, sheep and pigs. These results, combined with recent archaeological findings, suggest that goats and other farm animals have multiple maternal origins with a possible centre of origin in Asia, as well as in the Fertile Crescent. The pattern of goat mtDNA diversity suggests that all three lineages have undergone population expansions, but that the expansion was relatively recent for two of the lineages (including the Asian lineage). Goat populations are surprisingly less genetically structured than cattle populations. In goats only ~10% of the mtDNA variation is partitioned among continents. In cattle the amount is >50%. This weak structuring suggests extensive intercontinental transportation of goats and has intriguing implications about the importance of goats in historical human migrations and commerce.

Conservation News

Xth meeting of the Alpine ibex European Specialist Group

A Conference on the biology and conservation of Alpine ibex was held in Cogne, Italy, on December 5-6, 2000. The meeting was sponsored by the Gran Paradiso National Park and "Interreg" funds from the European community. It involved 24 oral presentations, about 25 posters, and a general discussion of the future of the Alpine ibex European Specialist Group.

The Alpine ibex is one of the "Success stories" among Caprinae, as it was brought back from the brink of extinction by reintroductions that all originated, directly or indirectly, from the only surviving population in what is now the Gran Paradiso National Park in northwestern Italy. Ibex populations have now been established in many parts of the Alps, and the species is legally hunted in Switzerland, Austria and Slovenia. In France and in Italy, ibex number in the thousands and the legalisation of hunting is being considered. Twenty years ago, reintroduction to former range was the greatest challenge facing ibex conservation. As that challenge has been successfully met, new ones have emerged.

The meeting in Cogne was meant to promote international collaboration on ibex conservation, management and research. The range states will benefit by sharing and comparing experiences, problems and successes in ibex management and conservation. In addition, because ibex are apparently unaware of political boundaries, some international coordination in ibex management across the Alpine arch is highly desirable.

Speakers from France, Italy, Austria, Switzerland, Slovenia, Norway, the USA and Canada presented recent results of research into ibex population dynamics, social behavior, management and disease.

Transmission of disease and parasites from domestic livestock is a major concern for ibex management, with kerato-conjunctivitis being a particularly serious concern. Recent genetic investigations appear to refute the suspicion that some populations of ibex, particularly in Switzerland, may include genes from domestic goats. The possible hybridisation with domestic goats, however, remains a concern in several parts of Alpine ibex range. Ongoing research on genetic diversity aims to quantify heterozygosity in different populations. Unfortunately, several past introductions were made from populations that were themselves the result of reintroductions, leading to a series of cumulative bottlenecks and loss of genetic diversity.

Ongoing and planned research will address the consequences of varying levels of genetic diversity for individual survival, growth, reproduction and resistance to parasites. Eventually, these studies will test whether or not there is a link between genetic diversity and population performance.

The return of large carnivores, such as lynx and wolf, that can effectively prey on adult ibex, will present both challenges for management and opportunities for research, although we are likely still very far from a time when predation will have an important effect on Alpine ibex population dynamics.

Climate change may be a much more pressing concern, particularly in light of an analysis of long-term census data from the Gran Paradiso National Park that suggests that the ibex population there may be limited by winter snow accumulation.

Personally, I was encouraged to see the number of talented researchers, especially young researchers, from several Alpine countries, that are studying various aspects of Alpine ibex biology. There clearly is much opportunity and need for international collaboration, and this meeting was an important step towards fostering that collaboration.

The initiative of the Gran Paradiso National Park in organizing and sponsoring this meeting must be commended – it is fitting that the one entity that was single-handedly responsible for saving this species from extinction should now take a leadership role in fostering conservation and research.

Several presentations underlined the key role of the many types of data gathered by two generations of wardens of the Gran Paradiso National Park. Increased knowledge of Alpine ibex will also help in the conservation of other *Capra* species and subspecies that live in less accessible regions or that are less studied.

The need for long-term studies based on monitoring a large number of marked individuals was made very evident by several presentations. Under the sponsorship of the Office National de la Chasse, this approach has been bearing fruit in France. Recent initiatives in Italy, particularly in the only autochthonous population of this species in the Gran Paradiso National Park, will hopefully be equally as productive. Alpine ibex are a valuable economic and natural resource, and can become a major component of the conservation and restoration of high-altitude ecosystems in the Alps.

The meeting in Cogne clearly showed that the scientific expertise and the personal commitment needed for successful management and research programs are available within the range states. What is required now is greater institutional acceptance of the key role that must be played by long-term scientific research in ensuring the continued success of Alpine ibex conservation.

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First announcement & call for papers

XXVth International Union of Game Biologists Congress and Perdix IX International Symposium
"Wildlife Management in the 21st Century"
September 3-7, 2001
Lemesos (Limassol)
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Notice to Contributors

Submissions of articles, including **research reports, conservation news, recent publications, etc., on wild or feral Caprinae**, are always welcome from any professional biologist. A potential author does not have to be a member of the Caprinae Specialist Group. Please send submissions to the Editor, either by post or by e-mail attachment.

Acknowledgements

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CSG Web Site

http://callisto.si.usherb.ca:8080/caprinae/iucnwork.htm

Editorial Note

Views expressed in the articles in this newsletter, do not necessarily reflect those of the Caprinae Specialist Group

Recent Publications on Caprinae

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Third World Conference on Mountain Ungulates

Saragossa (Aragon, Spain), 10-15 June, 2002

The First World Conference on Mountain Ungulates, was held in Camerino (Italy) in 1989. At this Third Conference the focus will be on all aspects of Mountain Ungulates biology, management and conservation. The main goal is to present the progress made over the last few years on our knowledge of Mountain Ungulates. The program will include both oral presentations and posters. The preliminary program includes a keynote lecture and four sessions, each starting with an invited speaker. We expect that most contributed presentations could be accommodated within one of these 4 sessions: Conservation and Management; Taxonomy and Genetics; Pathology; Ecology and Behaviour. Abstracts of posters and presentations will be made available to all participants at the beginning of the conference.

Conference fee. **Registration,** including reception, abstract book, excursion and banquet will be 150 Euro per person, 100 Euro for students without institutional support (certificate required).

Preliminary interest. Those interested and wish to be included in the Conference mailing list should complete a registration form and sending it to Dr. Juan Herrero (address below). An e-mail version can be obtained from Juan Herrero <egasl@arrakis.es> or from the CSG website: http://callisto.si.usherb.ca:8080/caprinae/iucnwork.htm

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