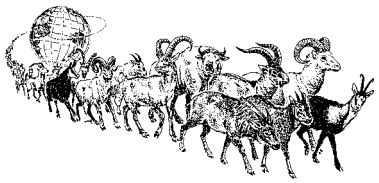

# Caprinae

Newsletter of the IUCN/SSC Caprinae Specialist Group

December 2000

## In this issue



## Editorial

The CSG's **Caprinae Taxonomy Workshop** held 8-10 May was a complete success and a credit to the organising committee. Special thanks must go to Dr. Can Bilgin and Prof. Aykut Kence along with their team, for the superb organisation in Ankara. We achieved all the workshop objectives and more. A total of 39 people attended, representing 17 countries. For more information visit the CSG's website. where besides details of the discussions from the Ankara workshop, you have an opportunity to participate in a discussion on Caprinae taxonomy.

An immediate result of the workshop was the formation of the Taxonomy Working Group co-ordinated by Dr. Gordon Luikart (see page 3).

Planning also began to hold the **III World Congress on the Biology of Mountain Ungulates** in Spain in 2002. Local organisation is being led by Dr. Nicolas Franco and Dr. Juan Herrero. Another suggested workshop was on the economic, social and biological consequences of trophy hunting, that could be held in central Asia in 2001 (in co-operation with the IUCN Sustainable Use Group, Safari Club International, and other interested parties). Both meetings will provide updates in advances in our knowledge of Caprinae taxonomy.

Thanks to Marco Festa-Bianchet, the CSG now has its own web page (see page 9).

IUCN begins a new triennium in October, at which time I will step down as chair of the CSG. I am very pleased to announce that Marco Festa-Bianchet has agreed to be nominated to take over - buona fortuna!

**David Shackleton**
**Editor**

## Award

Belated congratulations to Dr. David Klein, University of Alaska, who was awarded the 1999 Aldo Leopold Memorial Award. This is The Wildlife Society's most prestigious award. and is given for distinguished service to wildlife conservation. David is co-author of the country report for the U.S.A. in the CSG's Action Plan.

## Research Report

### Habitat & diet selection of muskoxen & reindeer in western Alaska.

On the Seward Peninsula in western Alaska, herding of introduced semi-domesticated reindeer (*Rangifer tarandus*) has provided a food supply and cash income for native communities since the late 1800's. Muskoxen (*Ovibos moschatus*) were introduced to the Seward Peninsula in 1971 and 1980. Since then, some reindeer herders have voiced concerns about potential competition for forage or antagonistic behavioural interactions between muskoxen and reindeer that might displace reindeer from feeding sites.

This echoes similar concerns of residents in other parts of the Arctic where muskoxen and caribou (also *Rangifer tarandus*) coexist (Wilkinson *et al*. 1976).

Due to their specific physiological and morphological adaptations to survival in the arctic, muskoxen and *Rangifer* have evolved different foraging strategies and habitat preferences which are believed to keep competition at a low level in most situations (Klein 1986; Schaefer *et al* 1996).

In response to the reindeer herders' concerns, the objective of our study was to characterize muskox and reindeer late winter habitat at different scales of selection (range, feeding site, crater, diet), to identify overlap and factors driving forage selection at each level for each species and to understand implications for competition between the two species.

The study area encompasses ca. 1500 $km^2$ on the northwestern Seward peninsula. Around 2,500 reindeer and 150-200 muskoxen occupied the area during late winters of 1996 and 1997. Feeding sites of both species were sampled and marked in March and April 1996 (n=15 for muskoxen, 14 for reindeer) and 1997 (n=14 for muskoxen, 12 for reindeer). On a 30m x 30 m sample grid, 10 random spots which characterize feeding sites and 10 randomly chosen craters were sampled for snow depth and integrated snow hardness using a Rammsonde

penetrometer (Lent and Knudson 1971).

The amount of above-snow vegetation (graminoids, shrubs or hummocks) was recorded at each sample point. A composite faecal sample from 10 pellet groups was collected at feeding sites (n=16 and 13 in 1996, 15 and 13 in 1997 for muskoxen and reindeer, respectively). Since the exact availability of habitat in late winter is not known for either species, "range" was defined as the area within a radius of one mile surrounding feeding sites. Within this area, plots characterizing availability at the range level (n=10 and 5 in 1996, 10 and 8 in 1997 for muskoxen and reindeer, respectively)were sampled in the manner described above for feeding sites.

Range plots, feeding sites and craters were marked and relocated in summer when vegetation cover was assessed using a 16-point sample frame.

No significant differences were found in snow depth and hardness as well as percent cover of major vegetation classes between muskox and reindeer feeding sites and craters. Three quarters of feeding sites of either ungulate were located in exposed upland habitats characterized by low snow depth and a higher lichen cover and lower occurrence of graminoids than other vegetation types present in the area. Spatial overlap in the use of late winter feeding sites between the two ungulates was considerable. Muskoxen and reindeer did not select differently when choosing feeding sites and cratering areas (Fig. 1).

Both species selected primarily against snow depth when choosing feeding sites and against snow depth and snow hardness when selecting cratering areas within feeding sites. Diet selection differed between muskoxen and reindeer (Fig. 2). Reindeer diets were dominated by lichens. Muskoxen showed more generalist feeding habits, and had significantly more sedge and moss and less lichens in their diets than reindeer (Ihl 1999). Due to relatively low densities and different movement patterns of the two species, direct encounters between muskoxen and reindeer appeared to be rare and temporal overlap at feeding sites was minimal. Few behavioural interactions were observed, and none seemed to result in the displacement of either species.

We conclude that despite similar use of late winter feeding sites competition between muskoxen and reindeer in the study area does not occur at the moment,

but may become more likely if severe snow conditions or increasing densities of one or both ungulates restrict the amount of available winter habitat.

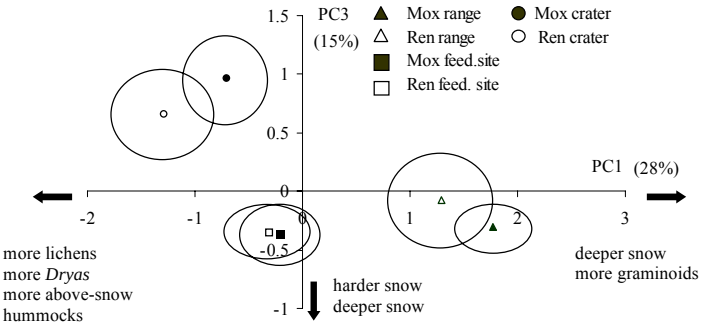


**Fig. 1.** Principal Component Analysis of vegetative and snow characteristics at muskox (Mox) and reindeer (Ren) range plots, feeding sites and craters, 1996 and 1997 combined. Means and standard error ellipses for PC1 vs. PC3. Data points are significantly separated along PC 1 (ANOVA, p=0.0001) and PC 3 (p=0.0005). PC 1 is graphed against PC 3 because PC 2 explains the same amount of data variation (15 %) as PC 3, but does not separate data points. Sample sizes are n=20 for Mox range, n=13 for Ren range, n=29 for Mox feed. site, n=26 for Ren feed. site, n=26 for Mox crater, n=15 for Ren crater.

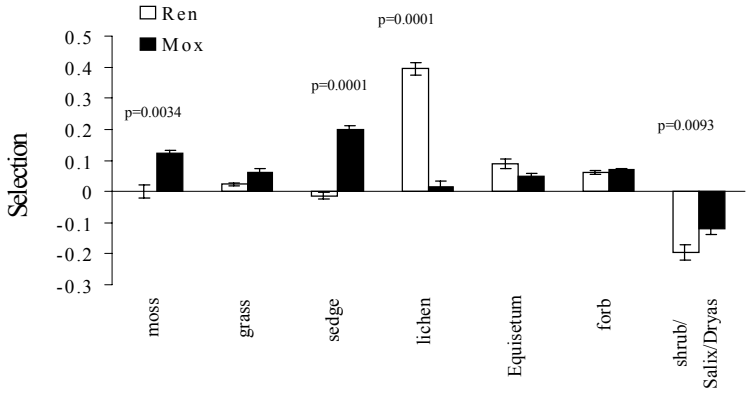


**Fig. 2.** Selection for or against forage classes at the diet level by reindeer (Ren) and muskoxen (Mox) during late winters 1996 & 1997 combined. Values were obtained by subtracting mean proportions at craters (availability) from mean proportions in the diet (use). Diets were estimated by adjusting occurrence of plant fragments in the faeces for differential digestibilities of forage classes. Shown are means (± standard errors). P- values are given for forage classes that are selected differently by muskoxen and reindeer (MANOVA, Interaction level of use*species). Sample sizes are n=15 for Ren crater, n=26 for Mox crater, n=26 for Ren diet, n=31 for Mox diet.

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## Taxonomy Working Group

The Taxonomy Working Group of the IUCN-SSC Caprinae Specialist Group was established during the Workshop on Caprinae Taxonomy held at Ankara (Turkey) in April 2000, with the following objectives.

**Objectives**
The IUCN Caprinae Taxonomy Working Group will strive to promote (i) conservation and long-term viability of wild populations and their habitats, and (ii) the understanding of the systematics and evolutionary history of the Caprinae. To this end we will try to do the following:

- Facilitate communication and exchange of information among taxonomists to avoid repetitive work and to promote rapid scientific advancement (e.g., we will posted on our web site a list of DNA sequences and microsatellites being used in each species).
- Promote the publication of results in peer-reviewed journals so that data and conclusions can be used with confidence in conservation management and in forensic or law enforcement cases.
- Help find and publicise potential funding sources
- Co-ordinate sample collection and analysis (e.g., see "Sampling Instructions..." below)
- Establish tissue and DNA banks accessible to researchers conducting genetic studies
- Establish a global DNA genotype database for forensics and population structure studies, including a standard set of DNA markers for forensics and population studies
- Provide expertise and assist with taxonomic problems that may arise in various conservation activities for Caprinae, including CITES regulations, enforcement, transplants, identification of taxa in particular areas
- Promote better co-ordination between researchers and hunting organizations. For example to insure that tissue samples and morphological measurements are routinely collected from hunting or culling operations and made available for scientific study.
- Prioritise taxa and populations for study using criteria such level of endangerment and the cost/benefit of the study
- Follow the regulations of the Rio International biodiversity treaty. For example genetic material will remain the property of the country of origin and be used only for scientific research.
- Write forensic descriptions for the identification of those taxa that can be reliably identified, and list those whose identification is currently difficult or impossible (It is immediately possible to conduct DNA fingerprinting and population assignment/origin tests in many Caprinae (e.g. for *Ovis canadensis* and *Capra ibex ibex*, the necessary data, statistical tests and DNA markers are available).

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**Contact** Gordon Luikart or Marco Festa-Bianchet if you would like to be part of this working group.

## Conservation News

### Religion protects Himalayan goral

In Nepal, Hindu and Buddhist faiths attest to the long tradition of appeasing natural elements such as a forest patches, hillocks or animals, making these the sacred symbols of epics, mythology and history. These communities are characterised by many indigenous beliefs and shamanistic practices, reflecting a widespread pre-Buddhist folk religion. It also involves more localised traditions, directly incorporated and subsequently reworked into the local ritual system.

Tache, a small isolated village of 45 households in the heart of a remote northern mountainous part of the country, is such a community, inhabited by the shamanist Gurung and Ghale clans. The settlement nestled on the rocky slope, is surrounded by mixed broad-leaved deciduous forests, with patches of conifer forests in rocky terrain. These forested mountains are home to the endangered Himalayan musk deer (*Moschus moschiferus*) and such caprins as primitive Himalayan goral (*Naemorhedus goral*) and Himalayan serow (*Capricornis sumatraensis thar*), while Tibetan blue sheep (*Pseudois nayaur nayaur*) are found in the adjoining high alpine grassland.

Goral in the Annapurna region reside on the both sides of the Annapurna massif at the altitude of 900 to 2,750 m, but they have also been recorded as high as 4,000 m. Goral, sometimes seen foraging on the rocky grassy slopes nearby Tache village, have long survived the local hunting tradition. The secret of the thriving local goral population in this remote place inhabited by the country's most skilled hunters, is paradoxically due to a strange practice in which goral are sacrificed to placate a mountain deity called "*Tohn*". One of the four mountain deities believed to have migrated from nearby Tibet in ancient time, Tohn is placated each year with the heart of a live goral. The annual drama, known as *"Tohncheeba"* begins with the dark moon of April. After seven days of this particular day, one individual

from each household enters the forest to flush goral. Goral are trapped with nets set in strategic locations in ravines. Sometimes, it takes days to trap a goral in this precipitous habitat. After a successful catch, the ritual is unique and complex. Perhaps this is the only place in the Himalaya where goral is sacrificed for religious purposes.

The conservation aspect of this sacred practice is the long-held local ban on hunting of goral and other mountain ungulates in the surrounding areas. The Annapurna Conservation Area Project of the King Mahendra Trust for Nature Conservation, striving to integrate region's nature with culture conservation, incorporates such traditional practices into its nature conservation program.

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## The Nilgiri Tahr

The Nilgiri Tahr (*Hemitragus hylocrius*) is confined to the area called the Western Ghat mountain ranges of South India. Some areas of the ghat have small fragmented populations of the tahr, but fortunately Eravikulam has a viable population. Due to considerable protection their number is beginning to increase, and according to the latest census, Eravikulam has nearly 1,000 tahr. This species of tahr is listed as Endangered in the IUCN Red List of Threatened Mammals.

Eravikulam National Park in South India is one of the best places to see this highly endangered species locally referred to as " mountain goats". The park is located near Munnar in Kerala state, at the Southern tip of India. From Cochin City in Kerala, it is a 4-hour drive to the entrance of Eravikulam National Park. Then one has to trek 4 hours to reach a hut, a resting point in the middle of the park. Tourists are restricted to this core area of the park but can enjoy seeing the tahr in the tourist zone called Rajmallai.

The narrow and meandering trekking path in the park, was originally just a bridle-path for the early English tea planters, and is flanked on either side by rolling grasslands. It is a picturesque wildlife sanctuary protecting a vast expanse of high altitude grasslands. A steady climb steadily takes the visitor to the cloud-draped hillocks, with their sholas, terrestrial orchids and bright red rhododendrons. Small streams flow even in the middle of summer. The park is also home for wild dogs or dhole (*Cuon alpinus*), bison or gaur (*Bos gaurus* ) and a few tigers (*Panthera tigris tigris*). Elephants (*Elaphus asiaticus*) are not resident in the park, but move back and forth from Chinnar Sanctuary. More than 70 species of birds have been recorded in the park.

Munnar is a tea plantation town close to the Eravikulam National Park. The Kannan Devan Tea Company had lot of tea estates and most of the Managers were Englishmen who were renowned conservationists. Retired managers like J.C. Gouldsbury and M.R.P. Lappin, now settled in Scotland, made commendable contributions to the protection of the tahr. Over the last 10 or 15 years, the English managers have returned to their home towns, and now it is the time of Indian managers. The plantations are now held by Tata Tea Ltd.

Eravikulam National Park was formed by the Government of Kerala in 1978 for the protection of the tahr. It has an area of nearly 100 $km^2$. Rajmallai is the tourist zone where people come to see the tahr. The Forest Department has imposed a strict code of conduct and tourists shall not tease or frighten the tahr. The tahr are so familiar with the tourists that they often come close, sometimes intercepting tourist vehicles and almost rubbing shoulders with them.

Rajmallai, the tourist zone of the park is extremely well cared for. A sign of this is that it is virtually litter free. Such care boosts the prestige of the sanctuary and is noticed by visiting officials such as the Forest Secretary of the Government of India who paid a call recently.

The Nilgiri Tahr Foundation has been launched to create more awareness for the protection of the tahr because of its threatened status. The President of the Foundation is Mr. Mohan Alampath, Wildlife Warden of the Park, who is naturally completely familiar with the whole area. He is an accomplished naturalist, a fearless and dedicated law enforcer, and important morale booster for his colleagues.

The Foundation has an active program that includes censuses, behavioural studies, and general data collection on ecology and biology. The Foundation also co-operates with the Forest Department in developing strategies for tahr conservation. A joint census was recently completed, in which the Co-ordinator of the Tahr Foundation, Dr.P.V. Karunakaran, played an active role. Dr. Karunakaran recently completed his Ph.D. thesis on the high altitude grasslands of Keral, the preferred habitat of the Nilgiri tahr. After 2 years working in the Wildlife Institute in Dehradun, he has just returned to Kerala.
For further information on the Foundation and Nilgiri tahr, please feel free to contact either myself or the foundation president, Mr. Mohan Alampath.

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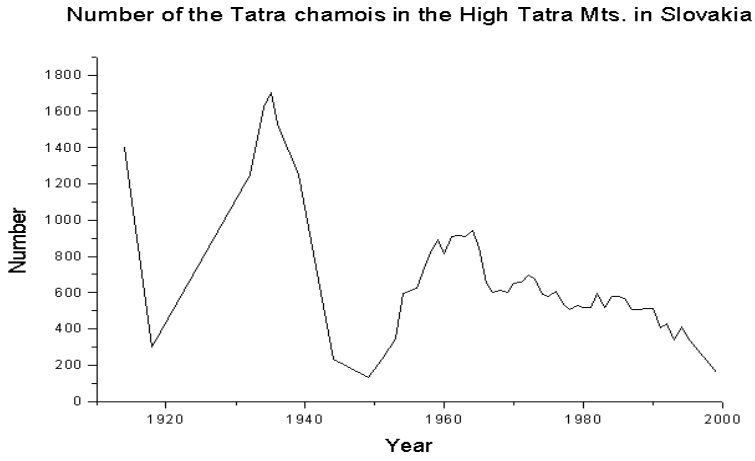
## The decline of the Tatra chamois

Only two populations of the Tatra chamois (*Rupicapra rupicapra tatrica*) are known to exist. One autochthonous population inhabits the High Tatra mountains in northern Slovakia and southern Poland and the second has been introduced to the south in the Low Tatra mountains of Slovakia. The population estimates of this subspecies in October 1999 censuses were 160 individuals in the High Tatras in Slovakia, and 60 specimens in Poland. The Low Tatra population counts record a relatively constant 120 to 130 individuals, but the genetic purity of these animals is questionable (see below). Although the population of the Tatra chamois underwent bottlenecks after each World War, today's numbers have declined to the same or even lower levels without any factor as pronounced as the wars.

After the World War I, the population number dropped to 300 individuals, and after the WWII to 132 to 230 (Chovancová *et al.* 1997, Radúch 1999). Between the Wars, the population recovered quickly reaching as high as

1,705 individuals in 1935. However, the population number remained low after the WWII until 1951, when it increased to 822 to 944 individuals (1958-64). Then in 1966, there was a decrease in numbers




(Hrabě 1997) (Fig. 1). The decline initiated efforts to intensify conservation of the Tatra chamois. Various factors were thought to be involved in the decline ranging from an altered age structure and a deviant sex ratio induced by selective shooting, a series of consecutive severe weather conditions during the winter and breeding season, stress induced by increased tourism resulting in changes in the daily activity pattern, and predation and parasitism (Chudík 1969, Blahout 1977). It was possible to only take measures that only partially affected most of these factors, so a project was proposed to introduce the Tatra chamois to the Low Tatra mountains to found a reserve population (Blahout 1968). This project was carried out between 1969 and 1976. The original 30 individuals released in the Lomnistá valley, successfully bred and expanded their range (Radúch and Karč 1983). Meanwhile, the High Tatra population seemed to stabilise at new equilibrium of 500 to 600 individuals (Hrabě 1997). However, when census data from the 90's are included, the period of 1966-99 shows a significant decrease (monomolecular growth model, $y = 639.47*\{1-EXP[-(-0.1054)*(x-2002.06)]\}$, $R^2(\%) = 86.17$). Moreover, the model predicts that the rate decline in numbers of the Tatra chamois will increase, reaching zero within 2 years.

Naturally, a mathematical model fitted to biological data is not always able to describe the real complexity of reactions and processes taking place in the biological system. Therefore, the decrease might be expected to slow down in the next few years, and thus resemble an anti-sigmoid curve.

The reasons for the decrease in numbers in the High Tatra population are not known, but several factors are suggested. Air traffic– both tourist site-seeing flights and rescue flights, frighten the animals causing panic – the animals jump down the slopes (Chovancová *et al.* 1997).

The stress arising from extensive tourism, that has been transformed from linear (tracks) to area (ski-alpinism, mountain climbing) activities, together with the disregard of seasonal closures of the alpine zone, disturbs chamois in sensitive seasonal (mating, births) and daily (feeding, resting) periods.

Unconfined tourism is especially harmful because people often stay overnight in high elevations away from official huts and tracks, and thus extending the disturbance period from the more usual period of a few hours around midday. This results in changes in the chamois' daily feeding regime (Chudík 1969, Blahout 1977, Chovancová *et al.* 1997), thus increases stress.

The Tatra subspecies was recognized by Blahout in 1972 (Blahout 1972), but for the purpose of conserving its genetic uniqueness, its distinct status was understood too late. In 1960, 21 Alpine chamois (*R. r. rupicapra*) were introduced to the Veľká Fatra mountains, and in 1963 another 6 individuals were released in the Slovenský raj mountains. The founders of both these introduced populations came from the Jeseníky mountains in the Czech Republic, and originated in the Alps.

The subsequent introduction of the Tatra chamois to the Low Tatra mountains, originally aimed to help the Tatra population to overcome the decrease in numbers in late 60's (Blahout 1968), complicated the situation even more. As these 3 mountain ranges are geographically close (ca. 50 km), hybridisation with Alpine chamois resulting from occasional migrations, might have occurred.

Since 1981, when a workshop on chamois conservation was held, elimination of the introduced populations has been proposed to protect the gene pool of the native Tatra subspecies. However, due to economic reasons, game organizations, that largely financed the project of introductions, vetoed the solution. Recently, the decline in numbers enabled conservationists to persuade the public of the need to take direct management measures, but genetic identification of the subspecies is desirable.

An estimation of the genetic constitution of the Low Tatra population is also necessary to enforce and substantiate the management projects. The situation facing the status of the Tatra chamois greatly resembles that of the Chartreuse chamois (*R. r. cartusiana*), where an increase in numbers has not yet won the battle to save the population because introgression and hybridisation are sealing the fate of the native subspecies (Roucher 1997, 1999).

Most recently a project to solve the critical situation of the Tatra chamois finally developed. Due to the enthusiasm of several people, the much needed co-operation was established. An extensive sample of scats (faeces) allowed us to rule out wolf predation on chamois as a reason for decline. Potential predation by lynx is currently being analyzed by the same method. Although Tatra chamois are protected year-round both in Slovakia and Poland, illegal hunting, often discussed anecdotally but never definitely proven, is now considered the most likely cause of the population decline. Thus, human interference is the direction where conservation efforts should now be directed.

Reducing illegal hunting will mean closing and guarding parts of the western Tatra mountains, namely the Tichá and

Kôprová valleys. Although both valleys lie in Slovakia, access to them is easier from Poland because of a cableway lift operating up to the Kasprov vrch mountain. Closing this access route for at least 3 years would require persuasive arguments that the Tatra chamois is a unique taxon. For this, genetic analyses is required. In addition, volunteers will be needed to monitor the population year-round, and other possible protection areas will be proposed.

It has been suggested that Tatra chamois be included in the Annex II and IV of the Habitat Directive of the European Union. For it to included in the Annex II, the protected areas could be established in Natura 2000 - the European ecological network of special areas of conservation.

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## California bighorn die-off

In mid-February 2000, reports of dead or dying sheep in the south Okanagan were received by the British Columbia Ministry of Environment, Lands and Parks (MELP). MELP responded immediately with ground searches and aerial surveys. In media contacts MELP solicited the assistance of the public in reporting additional sightings of sheep. MELP immediately established a team of expert veterinarians and biologists to collaborate on investigation of this bighorn sheep epizootic in the south Okanagan.

The geographical distribution of mortalities was on the east side of the Okanagan Valley, south of Penticton to the Osoyoos area. Necropsies of 15 dead sheep showed lesions of severe, subacute to chronic bacterial pneumonia with varying degrees of lungworm involvement. Currently, about 35 additional dead sheep have been recorded that also likely died of pneumonia but were not sampled in detail due to wild scavengers. Tissue samples were sent for laboratory analysis to the Animal Health Center of the British Columbia Ministry of Agriculture, Food and Fisheries

The bacterium, *Pasteurella multocida* was consistently isolated from the lungs of dead sheep. In some sheep, evidence of other pneumonia-causing organisms was present. *Pasteurella hemolytica (=Pasteurella trehalosi*), some types of which have caused acute bighorn die-offs elsewhere, was cultured from the nasal passage of two sheep carcasses. *Pasteurella multocida* is generally transmitted from sheep to sheep, primarily through close contact. This bacterial pneumonia in wild sheep does not pose a significant threat to the health of humans, pets, livestock or other wildlife.

Experience elsewhere has shown that it is not possible to effectively treat wild sheep affected by this type of pneumonia. Intensive aerial surveys suggest at least 75% of the sheep in this population are missing and have likely succumbed to this epizootic. MELP is continuing to monitor the status of the sheep population. This epizootic is not yet ended. A few recent sheep mortalities are still being discovered and investigated.

Normally the upcoming rut is typified by substantive movements of sheep, particularly rams searching for breeding opportunities, a behavior that may accelerate spread of pneumonia to adjacent sheep bands in the region. Also the subsequent onset of stressful winter weather may once again escalate the rate of mortalities throughout the south Okanagan.

Pneumonia epizootics in bighorn sheep populations are not uncommon, and have occurred elsewhere in BC as well as in a number of western States. MELP has been in contact with wildlife managers experienced with sheep die-offs elsewhere to enlist their aid.

Experience with other sheep epizootics suggests chronic pneumonia and the effects of the die-off may persist within the sheep population for some years. Lamb survival in the south Okanagan is anticipated to be low for several years. It is likely discrete bands of sheep have been extirpated, and thus, the range-use tradition of such bands lost. Surviving sheep may be slow to re-occupy sheep habitats left vacant from this die-off. Recovery of the south Okanagan bighorn

sheep population could be as long as a decade or more. Recovery of the south Okanagan sheep population will require a concerted restoration commitment from various levels of government and others with a stake in these important sheep.

The epizootic investigation team of biologists and veterinarians, as well as others with relevant experience, will gather at workshop in Penticton, early October 2000, to develop management recovery strategies.

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## Marco Polo Sheep

Reliable reports have been received by IUCN-Pakistan that some people from Wakhan corridor (Afghanistan) are bringing Marco Polo trophies to Misgar (Pakistan) and trading each head for a bag of wheat. Seven trophies were seen in a 2 week period alone. According to a local authority, this situation will likely continue if the Pakistan government does not take immediate action.

## Diseased Blue Sheep

This summer I heard that Blue sheep (*Pseudois nayaur*) in the Shimshal area of the Karakoram adjacent to the Chinese border, just south of Khunjerab Pass, in northern Pakistan, have been found dying of some unknown ailment. The diseased animals were found inside the boundaries of Khunjerab National Park. Locals suspect it is some disease that originated among the larger blue sheep population across the Shaksgam River in China, and is moving towards the large domestic livestock settlement at Shimshal Pass. Some locals estimate that they saw several hundred carcasses at some of the remoter high altitude meadows in Shimshal territory (mainly Sherlik) this summer.

Locals say they first noticed afflicted animals 2-3 years ago, near the Shaksgam River, and that numbers and the geographical distribution of afflicted blue sheep has been increasing since. Apparently all blue sheep, male, female and young, are suffering. Ibex and domestic livestock seem not to be affected so far. Locals are concerned that the blue sheep population might become seriously decimated and that the ailment might transfer to their domestic livestock. A couple of people I spoke with in Gilgit said that a similar "epidemic" afflicted the blue sheep population about 100-150 years ago, but I have not verified that.

In mid-July I was trekking beyond Shimshal Pass, at Chikkor. My Shimshali companions managed to catch one of the afflicted animals (at about 4000m... a fair bit lower than their normal habitat). It was able to propel itself fairly well with still-strong rear legs, but seemed almost totally unable to put weight on its front legs. Indeed, the animal's front hooves were swinging loosely on the ankle joints, suggesting that the muscles or tendons had disintegrated completely. More generally, the skin and flesh from the muzzle, the chest and the forelegs is disintegrating. A friend of mine who trekked in the same area earlier in the summer saw blue sheep with "large black protruding lesions off its muzzle". I took some pictures, which have been sent to veterinarians in North America for their comments [*Ed. note - some form of ecthyma is thought a strong possibility*]. According to my Shimshali companions, the animal we caught is a 4-year old male, and shows symptoms typical of other animals that have been caught or found already dead. We saw two other partially-decomposed carcasses near the animal we caught.

After some discussion in the village, Shimshal elders asked me to investigate the problem and suggest some course of action for the community. They would like to solicit assistance from Pakistani or international environmental agencies, but want to get a better understanding of what is happening first. As you can no doubt tell from my description above, I have absolutely no expertise in this area (I am a social geographer). I would appreciate any advice or information that the CSG could provide, either to identify the ailment or to work towards reducing its effects on the blue sheep population (and potentially, on local domestic livestock).

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## Blue sheep distribution in Pakistan - a correction

I authored a book, *The Mammals of Pakistan*, published in 1977 while living in that country, without access to modem data bases. It appears that I made an error in describing the distribution of Blue sheep. I was able to revise it extensively in an 1997 edition, but repeated the distribution error. As I have been quoted in many subsequent publications [Ed. This error is repeated in the CSG's Action Plan (page 247)], and as yet I am the only person in its 53 years of national existence, who has written about the Mammals of Pakistan, I feel that this needs correcting. This only came to light recently when Dr John Mock, from California, who has climbed in the Karakoram, questioned my statement. Without going into detail, after some research on my part, I was able to locate a Swiss Journal titled *Mountain World*, published in French by a Swiss Foundation, which I recalled was the source of my mistaken assumption. This journal ceased publication in the late 1960's. An article in French about the 1947 Swiss Expedition to Gharwal, was printed opposite a plate showing Bharal killed in the Himalayas. What I failed to realise at the time was that the photo in question related to a previous article about the Swiss Gharwal Expedition, but appeared facing the first page of an account of an American Expedition to K2 in the Karakoram. Reading the plate captions in French I wrongly assumed that they related to animals shot by a member of the American climbing team .

Please note that Blue sheep (Bharal) in Pakistan, is restricted to the upper Shimshal Valley, of the Northern Areas.

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## Abstracts

### Integrating Wildlife Conservation with Community-based Development in Northern Areas, Pakistan.

Amjad T. Virk. 1999. Unpublished Ph.D. Thesis, University of Montana, Missoula, Montana. 162 pp.

The Northern Areas (NAs) of Pakistan are considered a biodiversity hot spot, particularly for species adapted to rugged and high mountains environment. Many large mammal populations have been depleted, primarily by over-hunting. Recent community-based conservation and development initiatives may provide some hope for these species.

The Government of Pakistan and IUCN-The World Conservation Union implemented a project to demonstrate the Community-based Conservation (CBC) approach for conservation of biodiversity. I examined whether incentive measures used by the CBC had any impact on attitudes and perceptions of local people in the project areas towards wildlife and CBC approach. Field research was conducted by using participant observations, key informant interviews, and questionnaire surveys methods. Mountain ungulate populations were monitored by involving community guides/former hunters to see whether CBC had any effect on these populations.

I found that local people's attitudes and perceptions toward wildlife and its conservation were largely supportive. The villagers perceived village development, collective income, and beauty of their villages as the primary benefit of wildlife, while predation and competition with domestic stock were mentioned the main disadvantage by the most. In overall people supported CBC. They liked their involvement in the conservation program because they received benefits. Most frequently sought advantages of the CBC were village development, unity in the village, and reduction in poaching, whereas most believed there is no disadvantage of CBC. The villagers linked conservation with development of their villages and believed the sustainable use of wild species have potential to cover the local costs of village-based conservation and socio-economic development.

Mountain ungulate populations were monitored with Group Composition Counts (GCCs) and Repeated Group Counts (RGCs). The effect of CBC on these populations was generally positive. Sightings of Himalayan ibex (*Capra ibex sibirica*) and flared-horned markhor (*Capra falconeri falconeri*) increased considerably both in Khyber and SKB. The number of ibex observed in Khyber increased from 63 in 1996 to 152 in 1998. The juvenile per 100 female ratios suggested healthy recruitment into these populations. RGCs were found more suitable than GCCs for monitoring ungulate populations in the community conservation areas.

Incentives were largely effective for inducing local communities' involvement in CBC efforts. However, it is too early to say if CBC will be successful in the long run in solving conservation problems faced NAs of Pakistan, but it has provided a new and cost-effective way of conserving biodiversity. A combination of incentives and disincentives will be needed to maintain the biological diversity of Pakistan.

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## Recent Publications

### *Journal Articles*

Bérubé, C., M. Festa-Bianchet and J. T. Jorgenson. 1999. Individual differences, longevity, and reproductive senescence in bighorn ewes. *Ecology* 80: 2555-2565.

Bunch, T.D., Wang, S., Valdez, R., Hoffmann, R.S., Zhang, Y., Liu, A. S. Lin. 2000. Cytogenetics, morphology and evolution of four subspecies of the giant sheep argali (*Ovis ammon*) of Asia. *Mammalia* 65:199-207.

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Côté, S. D., M. Festa-Bianchet, and K. G. Smith. 1998. Horn growth in mountain goats (Oreamnos americanus). *Journal of Mammalogy* 79: 406-414.

Festa-Bianchet, M. 1998. Condition-dependent reproductive success in bighorn ewes. *Ecology Letters* 1: 91-94.

Festa-Bianchet, M., J.-M. Gaillard, and J. T. Jorgenson. 1998. Mass- and density-dependent reproductive success and reproductive costs in a capital breeder. *American Naturalist* 152: 367-379.

Festa-Bianchet, M. and J. T. Jorgenson. 1998. Selfish mothers: reproductive expenditure and resource availability in bighorn ewes. *Behavioral Ecology* 9:144-150.

Gaillard, J.-M., M. Festa-Bianchet, and N. G. Yoccoz. 1998. Population dynamics of large herbivores: variable recruitment with constant adult survival. *Trends in Ecology and Evolution* 13: 58-63.

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Réale, D., Festa-Bianchet, M. and J. T. Jorgenson. 1999. Heritability of body mass varies with age and season in wild bighorn sheep. *Heredity* 83: 526-532.
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Wehausen, J. D. 1999. Rapid extinction of mountain sheep populations revisited. *Conservation Biology* 13: 378-384.

***Other***

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## Editorial Note

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

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